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ON MR. BEANEY AND HIS UROLOGICAL WRITINGS AND EXPERIENCES.[1]

By LEONARD MURPHY, M.S., F.R.A.C.S.,

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THE object of this paper was to present an impression of some aspects of urology as practised in Victoria in the latter half of the last century, the sources being the books and articles of Mr. Beaney, a notable Melbourne surgeon of this period, as well as the report of the coroner's inquest on his case of lithotomy when current surgical practice was discussed. It was soon found that a short, lucid paper was impossible. With regard to Beaney's career, the biography in such books as "Victoria and its Metropolis" gives quite a different picture from that to be drawn from the writings of his detractors and from current legends. As to his books and lectures, the authorship of some, at least, is in question, while in the inquiry into his fatal case of lithotomy, contradictory evidence obscures the truth. For these reasons, this paper must be somewhat discursive and inconclusive, and more about Beaney than about urology.

James George Beaney was born in Canterbury, Kent, in 1826. He was articled to Mr. J. Cooper, surgeon, and studied at the University of Edinburgh. For reasons of health he abandoned his course and, in 1852, came to Melbourne, where he was employed at Hood's Pharmacy in Collins Street, as an assistant. In 1853, he returned to England as surgeon of the *Barrackpore*, and in 1855 completed his medical course in Edinburgh with the diploma "L. et L.M.R.C.S.". He was appointed Assistant Surgeon to the Third Royal Lancashire Regiment during the Crimean War, serving in Gibraltar and Sebastopol. After visiting America, he returned to Melbourne as surgeon on the clipper ship *Shooting Star*. In 1857, he acted as *locum tenens* to Dr. Maund, and succeeded to the practice on Maund's death.

Beaney joined the Medical Society of Victoria in 1857. In 1859 he produced the first book on surgery published in Australia, "Original Contributions to the Practice of

[1] Past President's address, delivered at the twelfth annual general meeting of the Urological Society of Australasia, Melbourne, March, 1959.

Conservative Surgery", and this was followed by many other books and papers. He was elected F.R.C.S. (Edinburgh) in 1860, and in the same year was appointed Honorary Surgeon to the Melbourne Hospital (Figure I). He was unsuccessful in the 1865 election, regaining his position in 1875, at the top of the poll—an occasion celebrated by a complimentary banquet for 500 and the presentation of a gold watch. He was the first honorary to give clinical lectures and operative demonstrations on the cadaver to students. He awarded gold and silver medals to his best students, making the presentations of these occasions for lectures.

In 1878, he made an extensive tour abroad, bearing a letter from the Chief Secretary of Victoria accepting Beaney's offer to investigate and report on modern European hospitals. While abroad he gained the qualifications L.K.Q.C.P.I. and M.D. (St. Andrews). He donated scholarships of £1000 to Guy's Hospital and to the University of Edinburgh, as well as gifts to the University of St. Andrews, and to various institutions in Canterbury.

On his return to Melbourne, he built a superb home in Collins Street (Figure II), now, after extensions, the premises of the Alexandra Club. His enormous success in practice continued, and his income is said to have been £14,000 per year. In 1883 he was elected to the Legislative Council.

Beaney's personal appearance was unimpressive. He was short and, in later life, stout, and wore his hair brushed up on either side in odd fashion. He wore diamonds and other jewels said to have been worth £10,000, on his watch chain and fingers, as well as in the form of studs. He was handicapped by a squeaky voice, for which, at one stage, he took lessons in elocution. He had a liking for champagne, and Morton (1959*a*) relates how, when especially pleased with his efforts at the operating table, he would send out to his carriage for a bottle of champagne, which he would share with the medical superintendent. His carriage, an open barouche, was as conspicuous as its owner.

Beaney died in 1891. In his will he left £10,000 to Canterbury to build an Institute for the Education of the Working Man, as well as money to Canterbury Cathedral for repairs and for a monument to himself. He endowed a number of scholarships, two at the University of Melbourne and others at St. Thomas' Hospital and Guy's Hospital. After other allocations, the residue, estimated in one notice at £30,000, was divided among Melbourne public hospitals and the University of Melbourne.

This brief factual biography gives the picture of Melbourne's most prominent surgeon, a very successful and wealthy man, a philanthropist and a member of Parliament—the Honourable James George Beaney, M.L.C., M.D. (St. And. *et* Melb.), F.R.C.S.E., L.K.Q.C.P.I., M.R.I.A., etc. (Figure III).

To his rivals and enemies this picture was false, and their freely expressed opinions are found notably in the *Melbourne Medical Record* (Figure IV) and in the *Australian Medical Journal*. The *Record's* titles for Beaney include "Little Pumpkins Pompous" and "Champagne Jimmy", and the caricature (Figure V) is from the same journal. An unkind statuette of Beaney is reproduced in Figure VI. To his enemies, Beaney was a charlatan and an incompetent surgeon, whose mistakes must be exposed and whose career must be brought to an end. The fact that three coroner's inquests were held after deaths of his patients and that he was placed on trial for murder amply support this. These cases were the death under anæsthesia of a boy of fourteen, on whom Beaney had completed a hip operation, and the death of a woman two months after amputation of a leg for tuberculosis of the knee; in neither case was any blame attached to Beaney. A third case is that of Robert Berth, who died after lithotomy, and this will be discussed in more detail. It is noteworthy that these three cases occurred immediately after Beaney's reappointment to the Melbourne Hospital in 1875, when Barker failed to be reelected. At the time Beaney was accused of having bought this position, and no doubt his money helped; but canvassing of subscribers eligible to vote was not abnormal, and Inglis (1958) recounts how a surgeon in 1907 bewailed having spent £2000 without being elected. Upjohn (1948) recalls seeing one of his honoraries entering a shop to ask for the proprietor's vote.

The murder trial in 1866 concerned a female patient, who died presumably of infection following an abortion. Craig (1950) has discussed this case at some length. Beaney was found not guilty at the second trial. Dr. Rudall, Dr. Pugh and Dr. Tracey gave evidence for the prosecution, with Barker assisting the Crown Prosecutor. For the defence, numerous medical men gave evidence, suggesting that Beaney's reputation was sound; there is no truth in Sadlier's (1913) assertion that these were "the black sheep of the profession". The evidence is so incomplete that the truth will probably never be known; but Thomas' (1866) article and *The Lancet's* (1866) opinion confirm that Beaney was rightly acquitted. The latter asserts that "the post-mortem examination was of the roughest and most incomplete description", and that "he was very properly acquitted; indeed, there did not seem to be the slightest ground for any imputation against him".

This case seems to be the foundation for Beaney's present-day repute as an abortionist. Certainly the *Melbourne Medical Record*, which rarely failed to attack Beaney in some way in every number, anonymously implies by frequent reference to Beaney's uterine sound that Beaney may have performed abortions. Yet, in referring to this case, it states that "the man was put to great expenses in defending himself against a crime never committed". A legend describes how Beaney, on his way to operate, bought a bladder of lard, and, in answer to his young anæsthetist's question, explained that it was to be shown to the patient or the relatives as the trophy of the operation. He is also said to have carried gall-stones with him for the same purpose. Latterly, the "bladder of lard" story is told with reference to a projected abortion; but, as related by Zwar, who had close links with the period, it had no such significance. Morton (1959*b*) remembered Beaney as "having many characteristics of the charlatan", but not as an abortionist.

Lithotomy.

The case of Robert Berth was the subject of the well-known book, "Lithotomy—Its Successes and its Dangers" by an M.R.C.S.E. (probably Beaney), and comprises a verbatim report of an inquest held before the City Coroner, Beaney's version of the operation and comments of the Press. The book was published and distributed at Beaney's expense to counteract the adverse publicity of the case.

Robert Berth, aged 41 years, was admitted to the Melbourne Hospital on November 26, 1875, suffering from vesical calculus. He had previously been in hospital in Amherst, and was transferred to the Melbourne Hospital for removal of the stone. On December 2, lithotomy was performed by Mr. Beaney, the stone being large and removed with great difficulty. The patient died three days later. A cast of the stone was displayed in a bookseller's window in Collins Street, with a comment on its large size and the fact that Mr. Beaney had removed it (Figure VII).

On December 18 an anonymous letter, signed "A Practical Surgeon", was published in *The Argus*. This referred to the death under anæsthesia already mentioned, and continued:

> The second or lithotomy case was put on the table. The patient was a young and healthy man. Mr. Beaney stated to the students that as the stone was small he would perform the median operation; however, he attempted the rectal or Lloyd's method. After some considerable cutting he got into the bladder, but only to find that the stone was an unusually large one.
>
> Having failed, after strenuous efforts, to remove it, a bystander requested him to crush the stone. This advice, however, he would not take, as he stated he was most anxious to extract it whole. There were two other operations still open to him to save the patient's life, viz., the bilateral, or the supra-pubic. He did not avail himself of either, but continued pulling and pulling and bending the hospital's instruments, endeavouring to extract the large stone through the small opening. By sheer force the much-prized lump was hauled out. The

result, of course, is easy to imagine—the man died of peritonitis.

Now, Sir, had Mr. Beaney taken the advice tendered to him, and crushed the stone, it is almost a certainty that the man would now be alive. A cast of the stone is on view at a bookseller's in Collins Street east, as an advertisement for Mr. Beaney's great operative skill, but the poor man from whom this great specimen was extracted is in his grave. I wonder what reason Mr. Beaney will give the committee for not calling a consultation on these two cases. Perhaps they are exclusively his own operations, and that he feared his colleagues not understanding them might veto his chance of displaying such an amount of surgical skill. I am, etc., "A Practical Surgeon", December 18th.

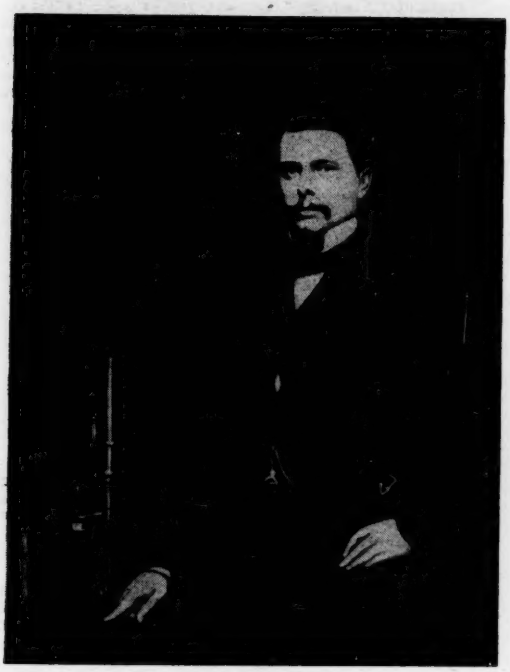


FIGURE I.

Mr. J. G. Beaney during his first appointment to the Melbourne Hospital. (From the original in the Melbourne Public Library.)

As a result, detectives made inquiries, the body was exhumed and a post-mortem examination was held on Christmas Day. A coroner's inquest was then held before a jury, to ascertain the cause of death and to assess whether any negligence on Beaney's part could result in his being indicted for manslaughter. The hostile remarks of the coroner leave no doubt on this point.

The evidence of the doctors is conflicting, owing to bias in one direction or another, and the truth is not readily obvious.

The post-mortem examination had been performed by Dr. Neild and Dr. Barker, both antagonistic to Beaney, the duty having been refused by Professor Halford and Dr. Rudall. The *Melbourne Medical Record* commented before the trial: "The Coroner's choice has excited some surprise as the relations between the former gentleman [Barker] and Mr. Beaney are well known. His opinion will doubtless influence Dr. Neild's." Neild reported the cause of death as "shock from injuries received during the operation, with consequent inflammation of the bladder, ureters and kidneys and peritonitis". He stated that there was a "tear in the rectum two inches in length", and described the kidneys as being of a deep "claret colour" and "much congested", the right one containing two stones, but strenuously denied that these findings indicated surgical kidney or other disease. No peritoneal wound or effusion was found, but this membrane was congested.

> All the parts from the triangular ligament to the wound in the bladder including the membranous portion of the urethra, the prostate gland, and the neck of the bladder, were destroyed.

Barker, in his evidence, boasts of never being mistaken in judging the size of a calculus, and of being able to crush this one or any other in three minutes, and is obviously hostile. It seems probable that Barker wrote the anonymous letter which caused the inquiry.

In the evidence there is much ado about the post-operative treatment; Beaney ordered "as much champagne as he could drink", for which the resident substituted brandy and lemonade.

FIGURE II.

An architect's drawing of Beaney's house—probably an unsuccessful entry in the public competition for designs for this residence. (By courtesy of the Alexandra Club.)

In the Coroner's biassed address, he remarked that "surgical kidney" was found only by surgeons, and that to them it was as "the cat to the domestic servant, the cause of a great deal that cannot be accounted for otherwise". He said to the jury: "You must expect from Mr. Beaney, as Senior Surgeon to this Hospital, a skill and readiness of resource which you have no right to expect from ordinary surgeons."

Despite this, no culpable negligence on the part of Beaney was found, but a rider to the verdict was added that, had consultation been held, other means of extracting the stone might have been used.

Beaney was given a complimentary dinner on January 24, the Mayor acting as chairman, and he was presented with a silver inkstand.

The *Melbourne Medical Record* of January 15, 1876, stated:

> Neild's evidence was not worth a twopenny ticket—Barker's was worth as much! . . . The Coroner was, as he always is, a humbug . . . the post mortemers were, the one prejudiced and the other incapable; and the whole inquest was a mixture of bunkum and bosh.

After reading contemporary authors on the subject, Sir Henry Thompson and Moreau among others, I had come

to the conclusion that Beaney's procedure in the case was justified. The detailed commentary on the case appearing in the *British Medical Journal* in 1876 can hardly be bettered, though I cannot agree with the last remark on the Coroner's impartiality. The first paragraphs of this article explain how Beaney's book, Press cuttings and a letter "filled with the most severe charges" against Beaney had been sent to the editor by a Melbourne correspondent who wished to remain anonymous, and who "called for a strong expression of opinion" from the journal. The editor dismisses the correspondent's letter from his consideration, except to state that it is "neither fair nor honest to bring such charges except in the most public manner and on the strictest proof". The commentary, in part, reads as follows:

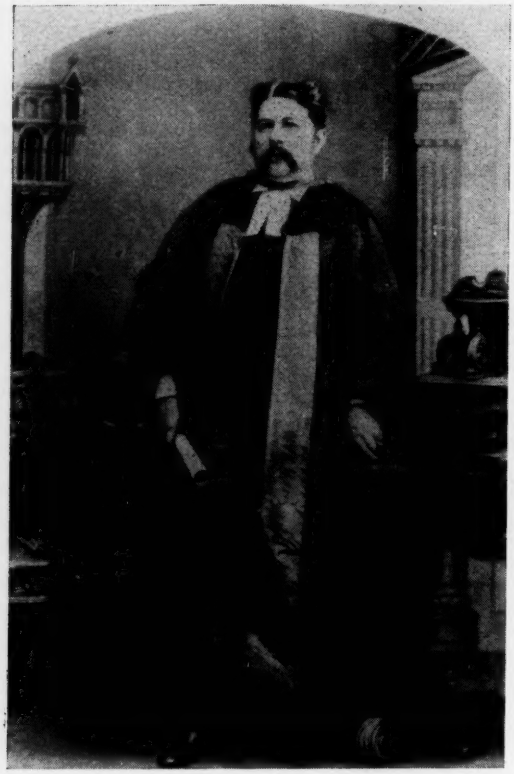
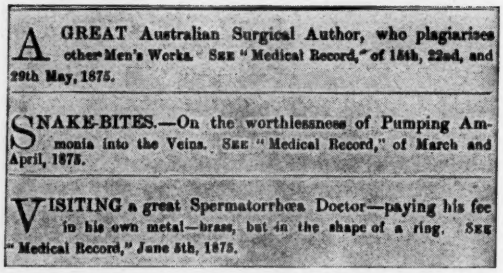


FIGURE III.

The Honourable J. G. Beaney, M.L.C., F.R.C.S. (Edinburgh), M.D. (St. Andrews), M.D. *ad eundem gradum* (Melbourne), L.K.Q., C.P.I., M.R.I.A. (By courtesy of Dr. Bryan Gandevia.)

The case has a twofold interest—surgical and ethical. We will first deal with its surgical aspect. The charges above numerated were certainly not substantiated sufficiently for legal proof. Mr. Beaney says that he knew the stone to be a large one. He proves that, on the day before the operation, he practised in the post-mortem room various methods of lithotomy, which he would not have done had he not thought the stone large; and finally, he selected the recto-vesical operation, which is, according to Sir H. Thompson, the best for the removal of very large stones from the contracted bladder. Even had Mr. Beaney been deceived as to the size of the stone, he would not have been the first surgeon of experience who had been so. . . . Nor is there any proof that unjustifiable violence was used. Those who have seen difficult cases of lithotomy are aware that much force is often necessary; and this leads us to the third point alleged against Mr. Beaney, that he ought to have broken the stone or performed the suprapubic operation. We cannot subscribe to this doctrine. The performance of the high operation would, we believe, have been inevitably fatal at the end of a severe operation for perineal lithotomy, in an empty bladder, with a stone measuring three inches, two and three-quarter inches, and two inches, in its several directions. Such a stone can only be extracted from the pelvic outlet when the soft parts are in position. . . . Nor is it at all clear that, even had Mr. Beaney had by him a proper crushing instrument (which seems not to have been the case), he would have improved his patient's chance of recovery that way. If Mr. Beaney's case had been argued by a properly instructed surgeon, instead of a barrister who allowed that he did not know till the previous day what a lithotrite was, the full discussion of this very point by so high an authority as Sir H. Thompson in the second edition of his "Practical Lithotomy", etc. (p. 108 *et seq.*, 1871), could not have been overlooked; and, as this eminent surgeon inclines to recommend in these difficult circumstances precisely the course which Mr. Beaney followed, since Mr. Beaney did succeed in extracting the stone, and since death seems to have ensued, partly at any rate, from the previous disease of the kidneys, an adverse verdict would, in our opinion, have been utterly



A GREAT Australian Surgical Author, who plagiarises other Men's Works. SEE "Medical Record," of 15th, 22nd, and 29th May, 1875.

SNAKE-BITES.—On the worthlessness of Pumping Ammonia into the Veins. SEE "Medical Record," of March and April, 1875.

VISITING a great Spermatorrhœa Doctor—paying his fee in his own metal—brass, but in the shape of a ring. SEE "Medical Record," June 5th, 1875.

FIGURE IV.

Notices inserted repeatedly in the *Melbourne Medical Record*, drawing attention to the more lengthy articles attacking Beaney, and also to one deriding Professor Halford's treatment for snake-bite.

indefensible. With regard to the cause of death, the gentlemen who conducted the post mortem examination attributed it to peritonitis, though they admitted there was no effusion in the peritoneal cavity; and they seemed anxious to rebut the suggestion that it was due to the condition of the kidneys. . . .

The same considerations apply to the lacerated and indistinguishable condition of the prostate and neighbouring parts. It was sought to be insinuated that these parts had been pulled out of the body at the operation; but there is no reason whatever for such a supposition, which is, in fact, inconsistent with the details given by the bystanders. . . . We have been thus circumstantial in examining the details of this case, on account of its surgical interest, and as a companion to other well known cases, such as Mr. Bransby Cooper's and Mr. Weeden Cooke's, where the surgeon has been blamed in consequence of accidents in lithotomy; and we must express a strong conviction that, whether any steps in the treatment of the case might or might not have been amended, no foundation was shown for any criminal charge.

When we turn to the ethical aspect of the case, we confess to a feeling of shame for the state of professional manners in Australia. Though Mr. Beaney is rightly acquitted of criminal negligence, we find him openly violating the laws of the institution to which he has been appointed, in a particular so important as that of consultation with his colleagues on a case among the most difficult of those which come before an operating surgeon. Had he fortified himself with the opinion of his colleagues, and procured their assistance at the operation, no charge could have been made against him. The book which he has put forward is, we must say, a model of bad taste and bad English; and he is not ashamed to publish extracts from newspapers even worse in both respects, in which a boast is made of his income of £12,000 a year, his house full of patients, his diamonds, and his generosity. Nor can we regard the

conduct of his colleagues in a more favourable light. It is clear that they refused to co-operate for the safety of the patients of the hospital with a man who they wished to represent as incompetent; yet they had not the manliness publicly to refuse to carry on the service of the hospital under such conditions. It is clear that they, or some of them, promoted, by anonymous letters in the newspapers, an inquiry carried on by means of detective policemen and a coroner's jury, which they ought to have demanded before the surgeons of the hospital, including Mr. Beaney himself, for the full and deliberate information of the governors on a point which (as we have sufficiently shown) only experienced and well-informed surgeons could decide. We find the junior medical officers, house-surgeons and house-physician, openly caballing against their senior, whom they were bound by every tie of professional honour to assist and support as far as possible; and we have the very pathological experts turning from witnesses into the most acrimonious of partisans. As one instance of the candour with which Mr. Beaney's actions are judged, we may mention that his saying, in answer to a suggestion of crushing the stone, "that he should like to get it out whole", is construed as meaning that he wanted the specimen as an advertisement, and sacrificed the man's life to this desire, while it may have meant that he considered (as Sir H. Thompson would) that it was the better course, if possible, to extract it without trying to break it. Yet we are obliged to add that it is said, and not denied, that a cast of the stone was really exhibited at a bookseller's shop to excite the admiration of the populace for this extraordinary operation. In fact, no one in the matter comes out entirely without discredit, unless it be the coroner, who seems to have acted with impartiality, and with as much dignity as his entourage permitted.

FIGURE V.

One of several cartoons in a long lampoon in the *Melbourne Medical Record*, 1877. Other practitioners, including Youl and Neild, having failed to cure the donkey's "caudal pleuro-pneumonia", Beaney amputated the tail. "Mr. Beaney intends to have the tail preserved and set with diamonds. He proposes to wear it at the next Governor's Ball."

Beaney's Writings on Urology.

The books, lectures and contributions to journals by Beaney are sufficiently numerous for a bibliography to have been compiled by Ford (1953). Only those dealing with urology will be considered here. Two books, "The Generative System" and "Spermatorrhœa", can to some extent be considered together.

"The Generative System and its Function in Health and Disease" was published in 1872, a third edition in 1877 containing coloured plates of the male and female pelvis. One cannot discuss its contents in detail, but it does cover the ground suggested by its title fully according to the knowledge of the time. It is very similar to several books of the period on the same subject, especially that of Acton, from whom Beaney quotes freely. The book achieves its object in providing education in sexual matters, but also contains much that every young man and woman need not know, including, as it does, such subjects as hermaphroditism, priapism, satyriasis, prostitution, masturbation and impotence. Among men endowed with abnormal sexual powers, he includes Hercules and Proculus, who is said to have deflowered ten female prisoners in succession. He draws the lesson that those who follow such vicious examples exhaust their vitality and are brought to "premature graves".

FIGURE VI.

Photograph of an unflattering statuette of Mr. Beaney. With his sleeves rolled, perhaps he is portrayed as about to operate. It would be interesting to know what fitted into the socket in the right hand. (By courtesy of Dr. R. L. Fulton.)

For the most part, the subjects are dealt with in a frank but inoffensive manner, though some case histories are in poor taste and tedious, while the style and phraseology remind one more of a medical journal than a popular text. Those suffering from the various ailments described might have obtained a reasonable explanation of the conditions and some reassurance and comfort from the author's optimistic prognoses. Many case histories of successful treatment are given. One such case is recounted in more dramatic fashion than the author's usual style.

> I well remember an educated gentleman rushing wildly into my consulting-room, about three years ago, saying that he had married a deformed woman, and

asking what he was to do? I questioned him as to what shape the deformity assumed, and he replied that he could not perform the act of sexual congress. (He had then only slept with his wife one night.) I told him I had no doubt about his being able to accomplish the act in a night or two, and to keep his mind easy about the matter. In three days afterwards he again called upon me, and said he would sue for a divorce, as he was sure she was deformed. I desired him to bring his wife to me, and he did so. On examination, I found the hymen thick and unyielding; I therefore divided it with a bistoury, and dilated it with Weiss' dilator. The next day he grasped me most excitedly by the hand, and said it was "all right".

"Spermatorrhœa in its Physiological, Medical and Legal Aspects" was published in 1880, and was also directed to the public rather than to the medical profession. Beaney makes the following statement:

> Spermatorrhœa has come to be a byword amongst men when they find themselves subject to any simple flux from the urethra and they are apt to consider any fluid besides urine which may trickle from the urethra as a drain upon this most vital secretion, and accordingly experience alarm of more or less intensity as their minds are impressed by the current literature of this class of disease.

FIGURE VII.

Robert Berth's vesical calculus weighing 6·5 oz., shown with a lesser stone weighing 1·5 oz. for comparison. (From "Lithotomy".)

He refers to quacks attributing any weakness to spermatorrhœa with its dire sequelæ and expensive treatment. A long section refers to masturbation as a cause of spermatorrhœa, general debility, phthisis, insanity and epilepsy, as well as impotence. He notes that "sketches of the more serious phenomena of spermatorrhœa are chiefly from the pens of others who are of higher authority than myself", and the book is obviously more a compilation of others' work than an original text. He emphasizes that not all discharges contain spermatozoa, and that no diagnosis of spermatorrhœa is to be made without microscopic proof. He discusses discharges of prostatic and urethral origin in the differential diagnosis. This book gives a moderate and reasonable account of the disease as known at the time.

In the course of a long complaint against Beaney, Neild stated that these books and those on syphilis belong to "that class of literature which honorable men shun", and that "they were advertised in nearly every newspaper in the colony and it was in consequence of these books and their advertisement that Mr. Beaney was obliged to retire from the Medical Society".

In considering these books, which would cause comment even today, one must consider the period in which they were written. Melbourne's population had grown from 23,000 in 1850 to 400,000 in 1888. A large proportion of the citizens was living in the crudest conditions, and many undesirables had been attracted by the discovery of gold. Venereal disease was very common, and Robertson (1956) remarks that Beaney's books on syphilis were "an advertisement with the object of 'cashing in' on a disease, the prevalence of which may be gauged by the fever to participate in its treatment". The treatment of venereal disease was considered the province of the many quacks rather than the medical profession, and Upjohn (1959) recalls that it was badly done by both. In the preface to "Spermatorrhœa", Beaney asserts the reason for the book to be the profession's "frequent refusal to assist the victims of sexual excesses . . . who are driven into the hands of the vilest impostors and most designing charlatans by whom for years they have been cajoled, plundered and destroyed". He hopes to guide sufferers to legitimate practitioners.

Robertson's (1956) description of the public anatomical museums of the Jordans and of Kreitmayer and Wiseheart gives support to Beaney's statements. He remarks, especially with relation to that of the Jordans, on the very extensive and unrestrained sexual education to be obtained, as regards both the normal and the abnormal. There is no doubt that, whatever good intentions the proprietors asserted as to their desire to demonstrate "the works of the Great Creator" and to "promote Health, Morality and Religion", much in these exhibitions was frankly pornographic. In the case of Jordan, the hope of gaining patients frightened by the exhibition was a factor, and sheer quackery and extortion resulted. Robertson relates how one patient was told that his blood was full of spermatozoa which, if allowed to swim across the blood-stream, would cause vascular block and sudden death; 500 dollars was to be the price of cure. Sample specimens, modelled in wax, in Kreitmayer and Wiseheart's museum, were as follows:

No. 177. Paraphymosis and gangrene of the foreskin.
No. 178. Inflammation of the testicle, frequently the result of gonorrhœa.
No. 179. Syphilitic ulcers or chancres on the prepuce and glans.
No. 182. Destruction of the external organs from gangrene.

In Jordan's museum were the following:

No. 610. Imperfect erection during sleep.
No. 619. Expression on the face of one suffering from spermatorrhœa caused by self abuse.
No. 766. Gonorrhœa or clap with chordee or involuntary erection of the penis.
No. 881. Monstrosity with six legs, three ears and four arms.

Beaney must have made much money from these books and, by this type of advertisement, considerably enlarged his practice. Even now, as in Victorian times, the justification of such books is hotly debated. The medical Press in England, in reviewing Acton's book, acknowledged the need for education in such matters and for the suppression of quackery, and Beaney's books may have contributed to this end. Certainly his books were less frightening than the museums, and though Beaney's treatment may not have been cheap, it was preferable to that of the impostors.

On Stricture of the Urethra and Other Subjects.

Stricture of the urethra was the subject of a number of papers by Beaney. The first of these formed a chapter in Beaney's book, "Original Contributions to the Practice of Conservative Surgery".

This is a well documented survey of the subject. Many authorities are quoted, including Sir Henry Thompson, John Hunter, Brodie, Home and Civiale. His account of the local pathology and its effects on the proximal part of the tract, causing hypertrophy, dilatation and infection, is sound. The main causes of stricture are given as gonorrhœa, trauma and the employment of instruments in the treatment of disease, including the "*porte caustique*". His aims in treatment are, first, to restore the channel to its original capacity, and secondly, having accomplished this, to keep it open.

In treatment, progressive and repeated dilatation "holds out every prospect of success in the majority of cases". Before dilatation, Beaney suggests dietary and therapeutic measures to improve the patient's health.

Careful examination of the urine is advised before treatment. He uses urethral injections of belladonna to allay discomfort, and states that in some difficult cases the administration of chloroform may be needed for successful

dilatation. He prefers dilators made of silver or plated steel, highly polished, preferably solid and curved with a rounded end. Before insertion they should be warmed and oiled. Any "dashing style" or "*tour de maître*" in passing sounds is condemned, and a larger instrument than the urethral meatus admits readily should never be used. Dilatations are performed every three to six days until the stricture is under control. Beaney preferred to pass sounds with the patient in the erect position, unless under general anæsthesia, and used a stricture chair to support the patient, since fainting might occur. Beaney's chair is shown in Figure VIII.

As to other methods, Beaney condemns the use of the "*porte caustique*". He lists all the dangers and complica-

FIGURE VIII.
Mr. Beaney's stricture chair.

tions of internal urethrotomy, which "cannot be too vehemently denounced". External urethrotomy is performed only in intractable cases not amenable to dilatation, and he recommends the use of Syme's grooved staff.

In later accounts, he had recourse to rapid dilatation for the "older and cartilaginous" strictures, for which gradual dilatation is "worse than useless". This was done, under general anæsthesia, by forcefully passing a Holt's dilator through the stricture and leaving a catheter in place for three days. Beaney asserts that if it is skilfully performed, this treatment is safe and the stricture "does not as a rule return". This type of dilatation sounds fraught with dangers, but had been in use for many years and apparently was considered less risky than internal urethrotomy.

This account of stricture would be acceptable for the most part even now, though few of us would care to use Holt's dilator. In his case histories Beaney boasts of his many successes in difficult cases; but Harry Allen, the pathologist, is reported to have complained of the number of subjects coming to the post-mortem room after Beaney's treatment (Upjohn, 1959).

An article on "Cases of Abscess and Fistulæ of the Perinæum" in the *Medical Record of Australia* is founded on the lectures of his teacher, Syme. His rather redundant classification, in brief, is as follows: (i) inflammation of the periurethral tissues, with or without stricture; (ii) rupture of the urethra by violence; (iii) (*a*) ulceration of the mucosa behind the stricture, (*b*) rupture of the urethra behind the stricture due to forced straining to urinate; (iv) injury by instrumentation.

Most cases, some of which were seen in Gibraltar, were of fistulæ with urethral stricture, and were treated by laying open the fistulæ, while the stricture was treated by external urethrotomy and indwelling catheter.

A paper on "A New Method of Treating Acute Inflammation of the Testicle" in the *Medical Record of Australia* describes the emptying of the inflammatory hydrocele by trochar and cannula with symptomatic relief. After this treatment, Beaney notes how normal the testis itself usually feels while the lower pole of the epididymis is enlarged.

FIGURE IX.
"Stolen Plumes", a cartoon from *Melbourne Punch*, 1879, referring to the Medical Society's repudiation of Beaney during his tour abroad. The peacock on the left represents the Medical Society, while Beaney's plumes are labelled "Medical Profession".

Neuralgia of the testes is described as due to a number of causes, including ureteric calculus, or at times occurring without any organic disease. "Young men of nervous temperament are especially obnoxious to it." The patient in question is described as melancholy and debarred by his condition from concluding his matrimonial contracts. After three silk sutures had been inserted into the epididymis and left for six days, cure resulted—"he is about to complete his marital contract, with restored health and vigour for its consummation".

Beaney devotes a chapter of "Original Contributions to Conservative Surgery" to the subject of varicocele, and he also mentions this condition in "The Generative System". He states: "Varicocele is recognized by other appelatives, to wit, cirsocele, spermatocele." "Cirsocele" is an obsolete synonym, but I can find no reference to "spermatocele" as having this significance. Beaney's account of the anatomy and physiology is straightforward. He tabulates 17 methods of surgical treatment, preferring those of Velpeau and Vidal in which pins and twisted sutures are used. Infection is mentioned among the complications:

> The bugbear of inflammation should not frighten us from our propriety, nor need we anticipate the unhappy fate of Delpech—being assassinated by the patient—if suppuration of the testis ensues.

In "The Generative System" he recommends open ligation of the veins, and claims his operation as original, though at most it can be but a minor modification of a standard procedure.

Beaney's Authorship.

The question of Beaney's authorship has been discussed by Gandevia (1953). The *Melbourne Medical Record* published several malevolent articles on the subject in 1875, one of which is referred to in Figure IV. These claimed that Beaney's book, "Syphilis, Its Nature and Diffusion Popularly Considered", was a pirated translation of a German text by Jahr, and later, that this book, "Constitutional Syphilis", "The Generative System" and "Children, Their Treatment in Health and Disease" were the works of Dr. Hickson and a cartoon was published to emphasize the point. No details are given of "Dr. Hickson", but the reference is probably to a homœopathic practitioner who was fined one shilling for "assuming the style and title of Dr. without being registered". Perhaps

FIGURE X.

Cartoon from *Sam Slick in Victoria*, 1879. Doctors (all): "Trumps—Diamonds again." Dr. Blair: "That's the suit that suits me." Doctors (all): "We wish we had *been he* (Beaney)."

the tiny fine was a tribute to the odd defence that the title "Dr." on his sign might mean "debtor". It is suggested that Beaney paid him £2 per week for his efforts. Beaney, giving evidence in his case against Baillière, his publisher, admitted that he had several lectures including "Doctors Differ" written for him, and that he then rewrote these with "such additions as only a surgeon can make". During this case it is curious that no question was raised as to the authorship of the books listed above. The identity of the literary collaborator and the extent of his contributions are still uncertain.

Beaney's many contributions to journals, and his most important work "Original Contributions to Conservative Surgery", were his own work. Several chapters of this book have been discussed already, and Russell (1938) comments favourably on the chapter concerning anæsthesia, while the book itself received a very favourable review in *The Lancet*.

In view of this, the review in the *Australian Medical Journal* is enlightening as to Beaney's unpopularity with the Medical Society of Victoria. This review is an unwarranted and venomous attack, in which nothing, from the size of the type to the motives of the author, escapes comment:

> As a specimen of book-making it perhaps deserves credit for being a proof of the extraordinary effrontery which a man claiming to himself the position of a reputable member of a respectable profession can exhibit to the world.

After such a review, it is not surprising that Beaney may have sought help with some of his literary efforts, a not uncommon practice either then or now.

Beaney's Surgery.

Without accurate information, such as might be obtained by a study of Beaney's case-histories at the Melbourne Hospital, a true assessment of his surgical skill is difficult. The death of his patient after lithotomy is usually considered an example of his incompetence, but this is, as we have seen, not justified. The best-known story about Beaney in this respect, as related by Morton, is as follows:

> . . . on one occasion when he was tying the subclavian artery for aneurism, he pointed to the brachial plexus and inquired of his assistant, "Gus, what's them Tendons?". This story is probably apocryphal as Beaney held a F.R.C.S.

Morton saw Beaney operate once:

> During my second year, I joined a large concourse of students in the old operating theatre of the hospital, where Beaney was about to perform an operation which would make history, namely, to tie the abdominal aorta for aneurism. From my position, well at the back of the gallery, I got glimpses of the busy little man in the frock coat. I saw him again on the following day with his house surgeon, leading a procession of students to the mortuary to inspect the results of his operation.

The obituary notice in *The Age* refers to Beaney's surgical skill:

> Indeed *The Lancet*, perhaps the highest medical authority in the world, has more than once referred to his great skill, and on one occasion, speaking of his capacity as a surgeon, stated that the operation of tying the innominate artery, in which the deaths averaged 90%, was an operation in which his record as a successful surgeon had never been surpassed if it had been equalled . . . and Dr. Beaney was the only practitioner who had succeeded twice. . . . In what is generally known as the operation for the radical cure of hernia, he has had over 400 cases without a single death. . . .

In a hurried search of *The Lancet* index, I cannot find these references. The former claim is probably an inaccurate allusion to Beaney's lecture at the Melbourne Hospital, later published, on two cases of innominate aneurysm treated by consecutive distal ligation of the carotid and subclavian arteries with success. As neither Erichsen (1872) nor Holmes (1870), in their short lists of such operations, mentions any surgeon as having succeeded more than once, it is reasonable to accept this claim as an outstanding feat of surgery, although Beaney's operations were performed a decade later. The sequence of 400 operations for hernia without mortality is too improbable for acceptance without further confirmation.

Beaney is generally conceded to have been a decisive and swift surgeon, performing amputations and routine operations with skill. Upjohn (1959) gained the impression from his seniors that Beaney's pathology and anatomy were not sound, and that he was apt to be in trouble with deep dissection or difficult diagnosis, being overshadowed by Fitzgerald, a very capable surgeon. It must be remembered that this was an era of change in surgery; anæsthesia was in its infancy when Beaney qualified, and antiseptic methods were fully accepted at the hospital only in 1880, neither Beaney nor Fitzgerald being very convinced of their value. With the widening scope of surgery, Beaney, though probably as good as his immediate contemporaries, was being left behind by better trained juniors.

Beaney and the Medical Society of Victoria.

It has been noted that Beaney joined the Medical Society of Victoria early in his career, and "was obliged to retire"

from membership. To a large extent the poor repute in which Beaney is held today is due to the hostility displayed towards him by the members of the Society in both their writings and their actions. The significance of this has perhaps gained more importance than it should, for in the 1860's less than 10% of the profession belonged to this group, and the impression that Beaney was a solitary outlaw opposed to a fully representative body is wrong. Moreover, while the Society included most practitioners with hospital and other official appointments, the conduct of its members would excite much comment today. Thus Barker's public defence of Jordan's museum earned him the Society's reprimand and brought him close to expulsion, while Neild's imprudence both as a critic and as a practitioner led him into public brawls and court appearances, the *Melbourne Medical Record* suggesting that the "Medical Society do something to restrain their indiscreet and erratic brother practitioner and compel him to act with something like professional decency if not dignity". Publication of libellous letters by anonymous correspondents was a major failing of both the *Australian Medical Journal* and the *Melbourne Medical Record*. These remarks are not intended to disparage the Society, or two of its members who played an important part in the early history of medicine in Victoria, but rather to show how, in these early days of the colony, in the medical profession as in other walks of life, those preferring a new life in Victoria often displayed unconventional and uncompromising characters. It is to be remembered, too, that the profession was overcrowded in those days, competition being severe, and Beaney's flaunting of his financial success must have been galling to those whose practices were struggling despite hospital appointments. *The Lancet* comments:

> We see with pain that in the infant medical community of Melbourne the most extreme developments are found of party bitterness. The *Australian Medical Journal*, a young periodical which has only now reached its seventeenth number, gave early promise of merit. It is obvious that, to redeem that promise, it was necessary that the whole of the medical talent available in Melbourne should be represented. Unfortunately, it has pursued a different course. We find the present number mediocre in merit and malignant in criticism. We learn, in explanation, that the medical profession in Melbourne is divided into two sections, described by the *Age*, an Australian daily journal, as "a small, though not a very brilliant one, which styles itself the 'Medical Society Proper'; and a larger and certainly more able one, that constitutes the 'outside' professionals". We do not by any means affirm the propriety of this description of the parties.

It seems established that certain members of the Society did their best to have Beaney's reputation destroyed. The repeated investigation of his unsuccessful cases, after his reappointment to the Melbourne Hospital in 1875, caused his constant and bitter critic, the *Melbourne Medical Record*, to state:

> The operations performed have been jealously watched, and if not successful, the coroner has been called upon to interfere, with the charitable view of either getting the operator committed for manslaughter or ruining him in the eyes of the public. They have with the exception of one . . . refused to be present at the consultations called by him. It is well known that we do not believe in Mr. Beaney—his large diamond skill [*sic*] or authorship, but we do believe in fair play. . . . What has happened to Mr. Beaney may happen to any man who may find his way into the Melbourne Hospital with the resident and honorary staff inimical to him, and particularly when they can boast of having a penny-a-liner amongst them who, like Cassius, hath an itching palm.

A long leading article entitled "The Dead Set against Dr. Beaney" describes a further attempt on Beaney's reputation in the Bruce case, one of death following severe head injury, in which Beaney was snared in a "Morton's fork—he did not operate and hence is guilty of grossest neglect in not operating, whereas had he operated and death ensued he would have been equally guilty of 'Heaven only knows what'". This ends:

> Get Beaney out of the way no matter by what means, and then some of the sugar plums of the profession which he now enjoys may fall into the hands of his unprincipled traducers. Dr. Beaney may have made mistakes and so have his enemies, but the public have never heard of them because those who have committed them have combined to conceal each other's shortcomings: but notwithstanding his mistakes and faults he is worth a shipload of the envious and contemptible creatures who, if they had the power, would utterly ruin and destroy him today.

That, under these circumstances, no convincing proof of any culpable error or negligence on Beaney's part was ever produced, is evidence in favour of his competence as a surgeon. Certainly, the failures of other surgeons excited more sympathy than criticism even when, as in one case, a pack and a forceps were found at the post-mortem examination.

On occasions, the Medical Society listed its grievances against Beaney. Neild stated that "advertising and charlatanism are co-relative terms", referring to the extensive advertisements of Beaney's books, as well as the complimentary dinners and, at times, public notices in the Press, ostensibly by grateful patients, thanking Beaney for his services. Gandevia (1953) has recounted the stupidly exaggerated account of his war service which Beaney wrote for the *Illustrated Australian Mail*, and which his enemies frequently recalled. Neild asserts that Beaney "was not even honest in his advertising", and refers to Beaney's claim to the titles of Senior Surgeon to the Melbourne Hospital and Lecturer in Clinical Surgery. Neither position was recognized; but Beaney did inaugurate clinical lectures, for which he should be remembered, while the title of "Senior Surgeon" had been claimed and used by Barker and Fitzgerald previously, without comment. Other complaints listed concern his "personal vanity and vulgar display of wealth" and his employment of "needy and not too scrupulous writers to compile his books for him". He is also accused of causing patients to "view their ailments through a magnifying medium compounded of their fears and his exaggeration". He was said "to contract to cure where cure was impossible", and to "insist on large fees in advance in certain cases". This last seems to have been common practice in cases of venereal disease or when operation was necessary. No evidence is brought forward to support these claims, though Blair, Beaney's *locum tenens* whilst he was abroad, was charged with having asked £55 to cure a patient with "spermatorrhœa". Blair, in his denial, claimed that the letter on which the charge was based was a fraud, and resigned from the Medical Society.

Craig has mentioned at length Beaney's triumphal tour of Europe, during which he used to the full his semi-official letter from the Premier. The Medical Society of Victoria was so incensed by Beaney's favourable reception abroad that it held indignation meetings, and sent circulars (Gandevia, 1954) to medical societies and other bodies abroad, refuting the idea that Beaney should in any way be accepted as their representative. An attempt by Blair to hold a rival meeting to support Beaney was a failure.

This tour was the subject of a cartoon in *Melbourne Punch* entitled "Stolen Plumes" (Figure IX), though Fitzgerald pointed out that Beaney did not claim to represent the Medical Society. *Sam Slick in Victoria*, a short-lived rival to *Melbourne Punch*, published a more flattering portrait on this occasion and stated:

> The safe return to this colony of a persecuted man will afford a sense of gratification to all lovers of fair play. The manner in which Dr. Beaney has been treated by a colonial clique of medical men is disgraceful in the extreme. To club together to crush one man is bad enough, but to club together to injure him behind his back is unmanly in the last degree.

A second cartoon (Figure X) appeared in the same publication several months earlier.

Beaney's replies to his detractors were remarkably few. In "Lithotomy" he gives a short account of his version of the case. A few letters to the daily Press or the *Australian Medical Journal* correct grosser misstatements, or call on his anonymous enemies to declare themselves. In 1876, however, he delivered his famous public lecture "Doctors

Differ", the Mayor acting as chairman, and in this he turned on his old enemies, "Dr. Yield, Dr. Farquhar and Dr. Cool", with sarcastic vigour.

Beaney's Obituary Notices.

Beaney's obituary notices provide further evidence of differences of opinion as to his character and popularity.

The *Australian Medical Journal* conferred a last indignity by making no comment. *The Australasian Medical Gazette*, on the other hand, gave a detailed account of the career of "one of the leading and most successful surgeons in Australia; he was a generous and good hearted gentleman . . .". The lay Press was similarly divided. *The Argus* was brief and factual. *Table Talk* printed a derogatory character sketch, listing Beaney's wealth and notoriety as his only achievements; a remark to the effect that Beaney had become addicted to morphine in his last illness suggest's a colleague's prompting. *The Age* gave a long appreciation, and included details of the feats of surgery I have mentioned. *Melbourne Punch's* tribute seems too definite to be insincere:

> Though the late Dr. J. G. Beaney had no relatives in the colony, his death will be a loss in more respects than one. Dr. Beaney was one of our most brilliant surgeons, and his great skill was not only used in the Melbourne Hospital but in thousands of cases outside without fee or reward. The doctor loved his profession, and this love, coupled with his kindly and generous nature, caused him to be ever willing to attend gratuitously to a poor man's case. It was also remarked of him, too, that he was as attentive to those eleemosynary patients as to his large wealthy connection from whom he received royal fees. Socially, he was the best of good fellows and his charity, unchronicled in the press, is gratefully remembered amongst the sick and sorrowing poor. . . . He had many friends and (outside the professional jealousy which his superiority of skill provoked) no enemies. Peace to his ashes.

Conclusion.

Beaney, with his ostentation, his books and his litigation, stands out as a very remarkable man even among his unconventional contemporaries. With abundant ambition and energy, he achieved an enormous practice despite the active opposition of some of his fellow practitioners. The contrived inquiries into his surgical failures were neither successful nor justified, and there is no reason to believe that he was not as good a surgeon as the majority of his colleagues. His urological writings and practice appear sound according to the knowledge of the times. Contemporary opinion favourable to Beaney has been quoted, and an authoritative assessment of his life and times may show that the disrepute in which his name is commonly held today is not wholly justified.

> Yet thus far, Griffith, give me leave to speak him
> And yet with Charity. He was a man.
> Of an unbounded stomach. . . .
> Men's evil manners live in brass; their virtues
> We write in water. . . .
> And though he were unsatisfied in getting,—
> Which was a sin,—yet in bestowing, madam,
> He was most princely.
> So may he rest, his faults lie gently on him!
>
> KING HENRY VIII, IV, 2.

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I am indebted to Dr. C. Craig, Dr. B. Gandevia and Sir Edward Ford, whose writings on Beaney have been of considerable assistance. Sir William Upjohn and the late Mr. David Murray Morton have been most helpful with their recollections of earlier days. I am grateful to Mr. P. Sullivan for the preparation of the illustrations.

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The books and articles by Beaney referred to in the text are catalogued in the bibliographies of Gandevia and Ford, and a repetition of the long list is unnecessary. Various journals of the period have been consulted, including the *Australian Medical Journal*, *Medical and Surgical Review*, *Melbourne Medical Record*, *Australasian Medical Gazette*, *British Medical Journal* and *The Lancet*, as well as newspapers and periodicals: *The Age*, *The Argus*, *The Weekly Times*, *The Daily Telegraph*, *Melbourne Punch*, *Sam Slick in Victoria*, and *Table Talk*.

MODERN TREATMENT OF RENAL TUBERCULOSIS.[1]

By EINAR LJUNGGREN,
Stockholm.

AT the beginning of the present century the treatment of renal tuberculosis was entirely surgical, and with unilateral renal tuberculosis, the doctrine of Albarran *"tuberculose rénale = néphrectomie immédiate"* was generally accepted.

Even as recently as the year 1939, H. Wildbolz maintained the necessity of early nephrectomy with the following arguments:

> The undoubted fact that, if one organ in the uro-genital system is infected with tuberculosis, others will sooner or later be infected too, seems to make it necessary to detect the first focus early and, if possible, to remove it at once, if this severe and dangerous disease of the urogenital system is to be successfully combated. It has been proved that in tuberculosis of the urinary tract this first focus is almost invariably in the kidney.

One endeavoured to diagnose renal tuberculosis at the earliest possible stage, preferably before cystitis had appeared. As soon as the diagnosis of unilateral renal tuberculosis was made nephrectomy was as a rule performed, whether or not there were coexistent active lesions outside the uro-genital tract—for example, in the lungs. Sometimes the operation was carried out at such an early stage of the infection that the small tuberculous lesions in the kidney could be found only after a long search. In such cases there was sometimes only a pea-sized or even smaller tuberculous lesion; for the rest, the renal parenchyma was quite healthy. At that time a surgeon was very proud of having taken away such a kidney. Nowadays one shudders when one sees that such kidneys have been removed.

By improved diagnostic methods—e.g., by repeated inoculation into guinea-pigs of urine from patients with tuberculosis in regions other than the uro-genital tract—

[1] Read at the twelfth annual general meeting of the Urological Society of Australasia, Melbourne, March, 1959.

cases of asymptomatic renal tuberculosis were sometimes discovered. Some urologists did not perform nephrectomy in such asymptomatic cases. Sometimes it was then shown that the renal tuberculosis developed very slowly, causing the patients no inconvenience for a long time. This statement led many urologists to doubt whether it was really necessary in every case of renal tuberculosis to perform nephrectomy immediately the diagnosis was made. However, there were other factors which contributed to this altered opinion. The first was the new conception of the pathogenesis of urinary tuberculosis. Another was the fact, pointed out by many authors (Band, 1942; de Beaufond, 1950; Beskow, 1952; Franzas, 1952; Lindén, 1950; and others) during the 1940's and 1950's, that the performance of early nephrectomy had not led to any appreciable improvement in the results. They showed that the recovery rate after nephrectomy in renal tuberculosis had, before the introduction of chemotherapy, been fairly constant at 50% to 60% during the whole of this century. Of the other patients, about 20% to 30% still had active tuberculous lesions at the time of the follow-up examination, whilst the rest had died, most of them from uro-genital, miliary or pulmonary tuberculosis. Beskow made the formidable statement that in his series, of the patients subjected to nephrectomy for renal tuberculosis who had coexistent active extra-urogenital lesions at the time of operation, 48% died in a few years after the operation.

The reason that early nephrectomy did not lead to any appreciable improvement in our results lay in the fact that surgeons blinded themselves with the renal tuberculosis. This was treated as a local disease and not as a local manifestation of a general disease—i.e., tuberculous infection.

To increase the patient's resistance against tuberculous infection and in this way improve the results, it was suggested by different authors that sanatorium treatment should be combined with surgery in renal tuberculosis. Thus Gilbert Thomas, as early as 1928, made the following statement:

> Nephrectomy for renal tuberculosis must be preceded by sanatorium treatment in some instances and must be followed by sanatorium treatment in many other instances if clinical arrest of all lesions of tuberculosis is to be accomplished.

In Gothenburg, a unit for the treatment of uro-genital tuberculosis was established at Ravlanda Sanatorium in 1948.

Thus at the end of the 1940's — that is, just before the chemotherapeutic era — many urologists abandoned immediate nephrectomy. Instead *"néphrectomie opportune"* was adopted—that is, nephrectomy at the most suitable moment, when the patient has gained a high degree of resistance against the tuberculous infection.

In cases of symptomless renal tuberculosis in which the lesions were of small extent, some urologists did not perform nephrectomy, but kept the patient under observation and, if possible, sanatorium treatment, and further treatment was based on the development of the disease.

The introduction of chemotherapy did not at first result in any change in the indications for nephrectomy. It was soon found that when nephrectomy was carried out under an umbrella of chemotherapy the results were much improved. There were a significant reduction in complications in the period immediately after nephrectomy, greatly improved wound healing, and considerable reduction in, if not elimination of, the risk that miliary tuberculosis would develop. The mortality rate in the first years after nephrectomy was greatly reduced, from about 10% to 1%. Epididymitis, which, according to our previous experience, appeared during the first years after nephrectomy in approximately 15% of cases, was almost never found during this period. Tuberculous cystitis was often very much relieved or healed completely.

In the pre-chemotherapeutic era, tuberculosis appeared in the remaining kidney after nephrectomy in 15% to 20% of cases. This risk has been eliminated, as we have never seen tuberculosis develop in the remaining kidney after nephrectomy when this has been combined with adequate pre-operative and post-operative chemotherapy. Borthwick and Jacobs had the same experience.

At the meeting of the International Society of Urology in New York in 1952, it was also stated that by chemotherapy and sanatorium regime we had, to a great extent, brought help to patients with tuberculosis in the remaining kidney after nephrectomy or with bilateral renal tuberculosis. In many of these cases the bladder troubles disappeared. The tubercle bacilli disappeared from the urine, and the patient was able to return to his normal occupation. In many cases this was achieved by a course of chemotherapy lasting from one to two years.

In 1948 Semb had shown that with the protection of chemotherapy it was possible successfully to carry out partial nephrectomy in renal tuberculosis. This statement was received in Europe with great interest, and many leading urologists began to carry out this operation to a great extent. At the above-mentioned congress I presented a report on 10 cases in which I had performed this operation after a course of chemotherapy. Our pathologists made a detailed histological examination of the parts of 10 kidneys removed on partial nephrectomy, and found distinct signs of healing in many cases. In two cases the signs of healing were so pronounced that one could ask oneself whether, by continued chemotherapy for a longer period, tuberculous lesions could be successfully healed (Figure I)[1]. Therefore, we expressed the opinion that in cases in which minor lesions were present we should try to see whether we could bring about healing of the tuberculous process in the kidney by merely giving a long course of chemotherapy and sanatorium treatment. In all other cases of unilateral renal tuberculosis at that time, we recommended that total or partial nephrectomy should be performed.

However, because of the improved results of purely medical treatment by chemotherapy, many authors gradually began to take up a stricter attitude towards nephrectomy. Every year medicine gained a little more ground in urinary tuberculosis at the expense of surgery. At the European symposium for the combating of genito-urinary tuberculosis held at Frankfurt in 1953, in general a more conservative attitude was displayed towards the treatment of renal tuberculosis. Many authors pointed out that the results were significantly better with longer periods of treatment, and especially when this was arranged as combined chemotherapy with two or three agents given simultaneously.

At the next symposium, held at Burgenstock in Switzerland in 1956, the indications for operation on the kidneys were noticeably cut in favour of a long course of chemotherapy.

A notable contribution was the series published in the same year by Lattimer and Spirito. A group of 20 patients with renal tuberculosis of moderately or far advanced cavitary type, whose urine contained tubercle bacilli, were treated by these authors continuously for a year with triple-drug therapy—isoniazid, streptomycin and sodium PAS. In all cases the urine was cleared of tubercle bacilli. The patients were reexamined one year after the completion of the course of chemotherapy, and at the end of that time no relapse had occurred. One of their patients died of cardiac disease immediately after the completion of one year of triple-drug therapy. At necropsy the right kidney was found to contain the expected scar at the position of the pyelographically evident lesion. On histological examination of the scar the pathologist found no evidence of tuberculosis. No acid-fast bacilli could be grown from the kidney.

Lattimer and Spirito declared that this regimen had been so successful that they had not removed any tuberculous kidney or portions of kidneys at the Research Unit for Genito-Urinary Tuberculosis during the previous three years, except in one case in which the kidney was removed for histological examination. The histological characteristics of the far advanced lesions in this kidney showed

[1] For Figures I, II and III see art-paper supplement.

a tendency towards healing, but not complete disappearance of the changes due to tuberculosis. The pathologist Auerbach suggested that further chemotherapy (18 to 24 months) might have allowed healing to become complete.

We have nowadays also gone in for triple-drug therapy as standard treatment, and have had results nearly as good as those of Lattimer, in those cases in which treatment has continued for at least one year.

However, chemotherapy in renal tuberculosis has its limitations. An important factor in the achievement of good results from this treatment is renal function, for if this is diminished one cannot expect a sufficiently high concentration of the drugs in the urine. If function is good, there is no reason why the results should not be equally good whether the kidney contains one lesion or more, provided the lesions are connected with the renal pelvis so that they are in contact with the urine. When the lesions are isolated from the renal pelvis—for example, by a stricture in the neck of a calyx—the bacteriostatic drugs in the urine cannot come into contact with the lesions (Figure II).

It has also been shown by angiography (Figure III) that the blood supply to such isolated foci is often insignificant, so that not even through the blood-stream can any great amount of the chemotherapeutic agents reach these foci. It must be pointed out that, even if the concentration of the chemotherapeutic drugs is much greater in the urine than in the blood, one must not underestimate the significance of the blood-stream for the conveyance of the drugs to the tuberculous lesion. In all cases of renal tuberculosis—even in cases in which, according to urography, the tuberculous lesions have open communication with the renal pelvis—there are always macroscopic or microscopic lesions, at least in the adjacent renal parenchyma, which are not in contact with the urine in the renal pelvis. The healing of such lesions is dependent upon the extent to which the chemotherapeutic agents are supplied to them by the blood-stream. It has recently been pointed out by my collaborator Fritiofsson that, when the indications for operation in cases of renal tuberculosis are being assessed, angiography can be of value. If, during examination by the latter method, it can be shown that areas of the renal parenchyma with a poor blood supply are present, then one cannot expect chemotherapy to produce a satisfactory effect upon the tuberculous lesions which are situated in these areas. Therefore, in such cases one should consider performing some kind of operation.

Another factor of the utmost importance for the success of medical treatment is free drainage of the urinary tract. In urinary tuberculosis it is mainly stricture of the lower part of the ureter which impedes drainage of the kidney. In such a case, even if chemotherapy had a beneficial effect on the tuberculous lesions in the kidney, this would be of little advantage if the kidney was being destroyed by hydronephrotic degeneration at the same time. I shall shortly speak on the treatment of strictures of the ureter. I confine myself now to pointing out that, even if X-ray films show a stricture of the lower part of the ureter, with dilatation of the part above it and of the renal pelvis, this does not contraindicate the commencement of medical treatment, for such a stricture may be caused by œdema of the mucosa associated with an acute phase of inflammation, and it may therefore happen that the stricture will disappear under medical treatment and free drainage be reestablished. However, strictures in other parts of the urinary tract are also important in relation to medical treatment. If there is one in the neck of a calyx, and if this constriction leads to exclusion of the corresponding segment of the kidney, a tuberculous focus in it may remain active in spite of prolonged chemotherapy.

The most important criteria of improvement in a patient with renal tuberculosis are as follows: (i) disappearance of tubercle bacilli from the urine; (ii) arrest of the destructive process confirmed by X-ray examination; (iii) clinical relief of symptoms; (iv) disappearance of pyuria; (v) improvement in renal function. We regard the disappearance of tubercle bacilli from the urine as incomparably the most important of these. We carry out culture and guinea-pig inoculation with the urine every four or five weeks during a course of chemotherapy. However, it is necessary to interrupt the treatment for at least five days before taking the specimens. The prognostic significance of conversion of the urine is quite different, according to whether conversion accompanies exclusion of the tuberculous lesions in the kidney, or occurs when they still communicate with the renal pelvis. Only in the latter case is it a favourable sign of improvement. To some extent, the pyuria varies in direct ratio with the tubercle bacilli in the urine, though moderate or slight pyuria may persist in spite of very prolonged treatment, and even in the absence of tubercle bacilli in the urine.

We also consider it very important, especially in the early part of a course of chemotherapy, to carry out urographic examinations at regular intervals. Unless there are indications for more frequent urographic observations, we make them every four or five months. One of the great advantages is that in this way we can make sure that drainage of the urinary tract is free. In carrying out these examinations, we have been struck by the frequency with which the radiological picture remains quite unchanged during the course of treatment. The remarkable point is that we have seen bacilluria recurring in cases in which X-ray films have shown the lesions unaltered for many years, so that we thought they were healed.

However, it is often very difficult to interpret changes in the X-ray picture. Because of the anatomical conditions in the kidney, it is not to be expected that a cavity will disappear completely as a result of shrinking. *Restitutio ad integrum* of the radiological picture is therefore not to be expected, even if healing occurs. It is conceivable only in the case of very slight changes in the papillæ, before true cavities have appeared.

The appearance of a new cavity, or the enlargement of one already in existence, does not necessarily mean an advance in the tuberculous process. On the contrary, it may be a matter of sloughing of necrotic tissue, and may therefore be a sign of healing. Where it is a question of "cleansing" of a cavity, it is sometimes possible to see clearly how the enlargement of the cavity is accompanied by sharpening and smoothing of its outline. The appearance of a new cavity, or the enlargement of an existing one, may also be caused by a stricture in a minor or major calyx. We believe that a large number of the cavities to be seen on X-ray films have been produced to a great extent, and sometimes even entirely, in this way by hydronephrotic degeneration of the corresponding renal parenchyma.

Hanley has pointed out that widespread clubbing of the calyces shown at the first examination may be largely due to œdema or a mild degree of back pressure, and may disappear after a short period of treatment, leaving perhaps only one deformed calyx. However, a stricture in a calyx may also lead to the sealing off of the tuberculous lesion. A calyx may also be radiologically "obliterated" by caseous material; in such cases the "absent calyces" under observation may later open again.

If the whole lesion in the kidney becomes sealed off, tubercle bacilli and pus cells may disappear from the urine.

In our first series of patients we thought chemotherapy could be stopped when five successive guinea-pig inoculations had given negative results; but in recent years we have held that even if this occurs early in the disease, treatment in renal tuberculosis should in all circumstances be continued for at least a year.

My collaborator Fritiofsson performed estimations of the protein fractions of the serum by electrophoresis in patients treated at Ravlanda Sanatorium. He found that the average values for the alpha fractions were considerably above the normal values in the early stages of treatment, and showed a tendency to fall during the course of treatment. The average values did not become normal

until after 12 months' treatment. Since an increase in the alpha fractions has been connected with increased tissue destruction, the return to normal of previously increased values is regarded as a sign of decreasing activity of the tuberculous infection. Fritiofsson interpreted these results as showing that at least a year's treatment was necessary to bring the tuberculous process in the uro-genital tract under control. This investigation thus gives some support for the desirability of a long course of chemotherapy in renal tuberculosis.

In our opinion the introduction of chemotherapy in uro-genital tuberculosis does not diminish the need for sanatorium care—rather the contrary. All the drugs currently available are bacteriostatic; bactericidal action cannot be expected from the systemic concentrations that we obtain of these drugs. Therefore, the body's own defence mechanism must finally overcome the invading bacteria, and to assist this process we as yet know of no other treatment than a sanatorium regime. Two further reasons exist for hospital care during antibacterial therapy: continuous supervision is necessary because of the potential toxicity of the drugs and because ureteral stricture may rapidly develop during medication; and all experience has shown that in ambulatory treatment very many patients, despite possible assurances to the contrary, have not followed directions with absolute constancy. For instance, Alken and Busch (1956) found, during the observation of 120 patients under ambulant treatment, that about 40% of them deviated to a greater or lesser degree from the prescribed treatment, especially when there were no symptoms and they felt generally well. Murray reported in 1957 that, in a series of ambulant patients treated with chemotherapy in Scotland, it was found on testing the urine for PAS that very many had failed to take the drug, although they maintained that they had done so. The nature of the disease demands protracted hospitalization. Hardly ever can a patient with renal tuberculosis be considered fit for discharge after less than a year's treatment. This fact, and the complete freedom from symptoms which usually occurs immediately after treatment is instituted, make exceedingly great demands on the psychologically correct handling of the patients.

I will now describe the special measures taken at Ravlanda Sanatorium to prevent or diminish the mental depression which often results from protracted retention in hospital. Ravlanda Sanatorium, with its 80 beds for patients with uro-genital tuberculosis, is situated about 45 kilometres from Gothenburg. Pre-operative and post-operative antibacterial therapy is given at the sanatorium, but all surgery is performed at the surgical clinic in Gothenburg. Similarly, all radiological and cystoscopic procedures and complicated laboratory investigations are carried out at the parent hospital in Gothenburg. The doctors in the surgical clinic visit the sanatorium at least twice a week. The first and most important pre-requisite is that the patient from the outset should be frankly informed of his disease, and given an honest assessment of prognosis and probable duration of treatment. To help the patients with problems of finance, housing, etc., an almoner is attached to the hospital. The patients must have considerably more freedom than is the rule in other types of hospitals. Patients whose homes are in Gothenburg are usually allowed leave of absence at week-ends, and at national holidays about a week's leave is generally granted to all patients.

To provide the patients with opportunities for light manual or intellectual pastimes of suitable type is regarded as an important part of our task at Ravlanda. In addition to a carpentry workshop for the men and a dress-making room for the women, there are some special facilities. A painting studio has thus proved highly stimulating, not only for professional artists but also for talented amateurs. A library is kept in the sanatorium's "quiet room". Study circles in foreign languages have been arranged, and for patients who wish to study by correspondence study rooms are available. A factor of great importance for patients such as these is that the public rooms should be divided into several units. We therefore have no less than three sitting-rooms, and there are two small kitchens, where the patients can prepare between-meal snacks for themselves.

The medical direction of treatment at Ravlanda Sanatorium takes place exclusively from the surgical clinic in Gothenburg. Various alternatives for the treatment of uro-genital tuberculosis have been discussed. In many quarters it has been suggested that responsibility for the sanatorium treatment could suitably be entrusted to a "tuberculosis specialist", which in Sweden means a specialist in pulmonary diseases. In our opinion, however, the problems presented by uro-genital tuberculosis are so different that they certainly warrant uniform treatment under the direction of a urologist, notwithstanding the extra work outside his special sphere involved by the necessity of following developments in anti-tuberculosis drug therapy.

What are the indications for nephrectomy? One definite indication is the "self-nephrectomized", so-called "cement kidney". As has been pointed out, especially by Dodson (1950) and Hanley (1952), the tuberculous lesions in such kidneys do not heal, and these kidneys, being foci of tuberculosis, constitute a dangerous threat. Tuberculous pyonephrosis, especially if secondary infection has supervened, is another definite indication for surgery, and so are all kidneys with severely impaired function in which advanced tuberculosis usually exists. As I have just mentioned, in these cases one cannot expect any notable improvement by means of chemotherapy. However, if the decreased renal function is caused by a stricture of the ureter, and if the kidney is not too severely damaged, one should not perform nephrectomy, but resect the stricture and repair the ureter instead.

Social and economic conditions may sometimes affect the indications for nephrectomy. For example, if urine conversion has not occurred in spite of prolonged chemotherapy (such cases are, however, very rare), and if the patient is not able to continue medical treatment for a still longer period, the course of the disease can sometimes be shortened by nephrectomy, even if this means the sacrifice of a large portion of healthy renal parenchyma. Since nephrectomy is now performed only in advanced cases, and since the ureter is then usually involved, nephrectomy is now combined with ureterectomy in an ever-increasing number of cases.

The enthusiasm for partial nephrectomy has decreased considerably. I have performed only two such operations in the last two years. Some reasons for this changed attitude were the high operative mortality in some series and the complications which sometimes occurred after operation, such as urinary fistulæ, hæmorrhage, and cessation of function of the remainder of the kidney, which sometimes made its removal necessary. But the main reason for the restrained attitude towards this operation was the fact that in many cases in which partial nephrectomy had been carried out after prolonged chemotherapy, the tuberculous lesions had healed. Thus, in Gow's series of 38 cases in which partial nephrectomy was performed, the pathological report showed that the tuberculous lesion was healed in 23 (about 60%) of the cases.

It is very interesting to note that several authors have independently reached the conclusion that it is "sealed-off" lesions which should be reserved for partial nephrectomy. Other urologists consider that partial nephrectomy is also indicated in the case of large cavities in open communication with the renal pelvis, even if urine conversion has occurred, among other reasons because of the risk of stone formation and secondary infection (focal pyelonephritis).

Finally, I should like to mention that a method competing with partial nephrectomy for closed lesions—so-called speleotomy or cavernotomy—has been introduced within the last few years by Staehler in Germany, and has since been used with success by Aboulker in Paris. The technique is extremely simple. After a large lumbar incision and very careful exposure of the kidney *in situ*,

the excluded lesion is emptied by aspiration, after which the outer shell is incised, the caseous matter is removed by means of a blunt curette or a small swab, one gramme of powdered streptomycin is placed in each emptied cavity, and a small "Polythene" drain is fixed in it for subsequent daily instillations. The lumbar incision is closed with the drain or drains passing through it. For the next 14 days, daily injections of streptomycin or isoniazid are given through the drainage tubes.

Thus surgical intervention on the kidney has decreased, but surgical operations on the ureter and bladder have increased instead. In cases in which a dilatation of the ureter and pelvis above a stricture in the lower part of the ureter does not regress under the influence of chemotherapy, the stenosed part of the ureter should be resected and the ureter reimplanted in the bladder. By restablishing free drainage of urine, this operation removes the stasis and allows the dilated ureter and pelvis to return to normal size. It therefore saves the undamaged renal parenchyma from further destruction from pressure atrophy.

When there is a stricture in the lower part of the ureter, secretion of contrast medium by the kidney may be much reduced. Angiography may be of value in such cases, in order to decide whether a resection of the ureter or a nephro-ureterectomy should be performed. If the angiogram shows a good blood supply to the kidney, it is probable that the lowering of renal function is mainly caused by the stasis, and not by advanced tuberculous destruction of the kidney. In such cases resection of the ureter should be performed. In cases in which the blood supply to the kidney is poor, a nephro-ureterectomy should be performed.

Sometimes it is necessary to resect such a long piece of the ureter that reimplantation into the bladder is impossible. In such cases ureteric continuity may be obtained with the help of a flap of the bladder fashioned into a pedicled tube—the Boari-Casatti operation. If the resected segment of the ureter exceeds 9 cm. in length, this operation is impossible to perform. In such cases one can substitute an isolated loop of small intestine for the resected part of the ureter. In one of our cases the whole ureter was removed and replaced by a loop of intestine. In this way a kidney was saved which, before the operation, was shown by intravenous urography to be unable to secrete contrast medium. Since the operation, the kidney has been functioning well for more than two years.

Even in cases of tuberculous fibrotic contracted bladder, modern surgery can release the patients from their severe suffering. The condition mostly occurs in patients who have previously undergone nephrectomy. The purpose of treatment is to relieve them from their distressing frequency of micturition, but in many cases it has also another important task. The increased pressure in these bladders has often caused a vesico-ureteric reflux, which may produce uretero-hydronephrosis with destruction of the renal parenchyma in the remaining kidney by back pressure. In other cases this is produced by a stricture in the lower part of the ureter. Formerly these patients often died of uræmia caused by hydronephrotic degeneration of the kidney. In such cases of uretero-hydronephrosis, the primary purpose of treatment is to save the remaining kidney from further destruction. For these reasons one previously often performed a uretero-colic anastomosis. Many workers—for example, Cibert—experienced bad results from this method. He made the following statement:

> The period of survival is often short. The hydroureters associated with tuberculous cystitis are not suited to sigmoid implantation: most of the patients die after a few months or years from uræmia and urinary infection.

Others, such as Pyrah, Nicholich and Jacobs, did not take such a pessimistic view. Jacobs, for example, announced in 1956 that he had performed this operation since 1936 on 61 patients, and of these 30 were alive today, most of them in full-time jobs.

However, the majority of workers have abandoned this method, and instead perform a cutaneous ureterostomy. Some authors suggest that a "nipple" ureterostomy be carried out. My collaborator Obrant (1953) has devised a special technique for the formation of this penis-like appendage. An appliance with a cup is placed outside the ureteric orifice; the cup is made of plastic material and is modelled from a plaster cast of the skin round the orifice. With this method there is no need for a catheter in the ureter, and the attendant risk of infection, together with the discomfort of leakage near the catheter, is avoided. With this apparatus the patients suffer very little inconvenience from their condition. After this operation has been performed, several of our patients have been able to return to their jobs.

There are also other methods of urinary diversion. In 1956 Annis declared: "It is our opinion that ileal ureterostomy, successfully completed, is the safest means of urinary diversion so far devised." However, I do not think that the results of ileal ureterostomy are better than those of cutaneous ureterostomy with nipple construction, and the latter operation has a lower operative mortality.

As a rule it is not necessary to remove the contracted bladder after the urine has been diverted from the bladder, but in one case we were obliged to do so.

The patient after operation had a profuse secretion from the bladder. A stricture of the urethra developed, and prevented the discharge of this secretion. The condition became painful and necessitated cystectomy. The bladder proved to be shrunken and thick-walled.

Finally we have the possibility of using the intestine to increase the capacity of the bladder—that is, we may perform ileo-cystoplasty, thereby reducing the frequency of micturition. In the beginning, Scheele's "ringplastic" was most frequently used. Later different kinds of arrangements of the anastomosed ileal loop, such as "T-loop" and "cat's-tail", were also employed. Hanley has been able with an X-ray image intensifier to demonstrate that emptying of the bladder was better in the case of cat's-tail ileo-cystoplasty than in the other methods investigated. This should indicate that this method is the best. However, in recent years several urologists have preferred colocystoplasty to ileo-cystoplasty. In cases in which a vesicoureteric reflux with uretero-hydronephrosis occurs, dilatation in general greatly decreases, by reason of the reduced pressure in the bladder. In cases in which the uretero-hydronephrosis is caused by a stricture in the lower part of the ureter, the ureter should be divided above the stricture and anastomosed to the ileal loop. On the other hand, Pyrah is of the opinion that when the uretero-hydronephrosis is caused by vesico-ureteric reflux the ureter should be divided in its lower third and anastomosed to the ileal loop.

One technical detail I shall mention. When performing the anastomosis between the ileal loop and the bladder, one should not use silk or nylon silk in suturing the seromuscular layer. In some of my cases such sutures migrated into the bladder and remained adherent to the wall, with resultant stone formation.

In view of the good results obtained by ileo-cystoplasty in contracted bladder, we are nowadays inclined to reserve cutaneous ureterostomy for cases in which ileo-cystoplasty seems beyond the patient's power of resistance, in the faint hope that the function of the kidney may thus be restored sufficiently to make possible, later, the joining of the stump of the ureter to the bladder, by means of an ileal graft.

If the result of ileo-cystoplasty is unsatisfactory, it is still possible to resort to a secondary cutaneous ureterostomy.

These are accordingly our present indications for the treatment of renal tuberculosis. It is possible, as often occurs when something new is being tried, that we have gone in for the modern conservative treatment far too strongly. Recently Hanley, for example, has shown that hypertension has occurred in certain cases of renal

tuberculosis conservatively treated, and this should contraindicate going too far with conservative treatment. He makes the following statement:

> We are certainly most ardent supporters of conservatism, but would hesitate to exchange a healed tuberculous kidney for hypertension in a young person.

However, it was shown that all 17 patients in Hanley's series who were hypertensive had unmistakable radiological evidence of obstruction to the outflow of one or both kidneys. Such an obstruction may be eliminated by surgery, and if this is performed in time, the risk of the patient's becoming hypertensive during a course of chemotherapy should be largely eliminated.

Many leading urologists carry out approximately the same principles of treatment as we do ourselves. In May, 1959, the third symposium for the combating of genito-urinary tuberculosis is arranged to take place at San Michele on Capri in Italy. Large series of cases of conservatively treated genito-urinary tuberculosis will then be presented by many authors, and we shall have reports covering much longer observation periods than previously. We shall then seek to form an opinion as to whether we should continue with the course we have adopted or in some respect alter our indications for the treatment.

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THE PLACE OF DIALYSIS IN RENAL FAILURE IN SURGICAL PRACTICE.[1]

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THE life of the urologist has been made easier and his practice less exacting by the providential provision, in the great majority of patients, of a pair of kidneys. While he tinkers with one, he can confidently rely on the loyalty of its companion, and if he should find himself in trouble and be constrained to sacrifice the first, the second can reasonably be expected to hide his shame. As if this was not enough, he has the comfort of knowing that the maximum efficiency of either kidney is seldom put to the test, and that a fraction of one, working to capacity, can happily accept the load that earlier was shouldered by two.

But, despite these comforting thoughts, you are not in your practice immune from the vexing problem of renal failure. The removal of the sole functioning kidney when the first has been congenitally absent, or removed, or destroyed by disease, is a tragedy of the first order. I suppose it happens even in the best regulated circles; to our patient we can offer only a quick trip to salvation, and to our surgeon mute sympathy, however ill deserved.

It is, of course, true that the urinary apparatus is not entirely simple in its construction, for its begins with two very long and very narrow ducts, vulnerable to obstructions from within and from without. Later these join to form a single, albeit a roomy channel; but here again the urinary stream is embarrassed, at least in the male, by being constrained to share the highway with its demanding junior partner, who passes that way but seldom, but whose right to the road is not contested, since it is intimately concerned with the destiny of man.

No doubt you see quite often the patient with oliguria or anuria, who presents quite simply a problem of mechanical obstruction, and in whom diuresis, prompt and adequate, waits only on its removal. Its detection and correction are in the plumbing tradition, and you are specialists in this trade. I will, therefore, say little or nothing of these problems. It is, none the less, true that we general surgeons must constantly remind ourselves of these causes when we are treating patients with anuria, so that we never run the risk, in the midst of our biochemical endeavours, of overlooking a simple mechanical block at some point as the cause of a complete shut-down of renal excretion.

Our interest in the treatment of anuria began last year about this season, when we suffered the deep humiliation of having to fly three patients up north to the wrong side of the Murray. There, Dr. Malcolm Whyte and his colleagues at the Sydney Hospital set to work with their artificial kidney, reestablished prompt and sustained diuresis, and flew them down to us, washed and clean, almost within the hour.

Such loss of face could not be endured, so in May, 1958, we bought for my department a kidney of our own. It is a Kolff machine, compact and well tried, ordered from a catalogue and sold across the counter. Its capital cost was comparatively low, but its maintenance is heavier, for it must be charged, for each dialysis, with a ready sterilized disposable coil at a cost of 90 dollars.

[1] Read at the twelfth annual general meeting of the Urological Society of Australasia, Melbourne, March, 1959.

We have since attracted to my unit, or more correctly to that of my medical colleague, Professor R. R. H. Lovell, a wide variety of patients with oliguria and anuria. Of these 17 have so far come to dialysis, and although I have played a very small part in this work, which has been mainly the responsibility of my registrar, Dr. Vernon Marshall, we have all during the past ten months or so inevitably learned something of the problems which present in the management of renal failure, and something, too, of the place and limitations of the artificial kidney.

It is, of course, unreasonable to expect that it will be of any value in chronic disease of the renal parenchyma; it can do nothing to restore kidneys which have sustained irreversible damage to the tubules or glomeruli. It is true that our experience in the treatment of chronic renal disease is limited, but in none of the patients treated so far has there been a worthwhile remission. We were content to accept such problems when we were proving our machine and our technique, but the dividend was never worth while, and we now set them aside.

One patient was a man, aged 59 years, who was precipitated into uræmia after an ill-advised herniorrhaphy. We could only guess at the cause of his renal failure, and submitted him to dialysis on two occasions. The clouding of his consciousness was quickly dispelled, but the respite was temporary only, and at autopsy he was found to have hopelessly contracted granular kidneys.

This experience underlines one of the problems which continue to vex us—namely, that of diagnosis. All too frequently we are first confronted by a semi-conscious patient, and we have no measure of his previous renal function. We are often compelled to make as intelligent a guess as we are able, and to embark, if that seems to be indicated, on dialysis. All too frequently this turns out to be quite fruitless, when our patient is finally shown to have renal failure which is the end result of chronic and irrecoverable disease.

There can seldom be any merit in snatching out of the jaws of death a patient in advanced renal failure and already unconscious, if we are merely reserving for him, by our efforts, a more tedious and more lingering death. For the relatives, too, it raises only false hope, which does nothing to ease the anguish of the later and inevitable relapse.

Equally, however, we must not hesitate to hold out a helping hand, in the earnest hope that our patient is in a moment going to make his own first faltering steps to safety. We must not lightly allow him to demonstrate to us that his anuria is irreversible by the simple manœuvre of turning his face noisily to the wall and dying in uræmia.

The Leeds team, who recorded their first experiences with a dialysing unit at the end of 1957 (Parsons and McCracken, 1957), reported that they had considered it advisable to dialyse seven patients in advanced uræmia as a preliminary to the completion of diagnostic studies; all of them were eventually shown to have irreversible kidney damage, and none survived. The same point was made again in a recent communication by Kolff and his colleague (Keleman and Kolff, 1958), who found that dialysis was often necessary to demonstrate that the renal failure was irreversible.

The only type of chronic renal disease likely to be relieved by dialysis is an acute exacerbation of chronic pyelonephritis, but we have no experience of this type of case.

It was reported from the United States last year (Nakamoto and Kolff, 1958) that dialysis may sometimes usefully prolong life in patients in the late stages of polycystic disease. Of eight patients with severe uræmia, four lived for periods of up to one year. More than one dialysis was needed by several of them, and often it was two weeks after dialysis before there was any sign of improvement. We have not had the opportunity of proving our machine in this disease.

However, while admitting that dialysis has very little to offer in the correction of chronic renal disease, we were, quite early in the development of our kidney, forced to ponder the question of whether or not dialysis had a place as an ancillary in the pre-operative management of patients who had established or incipient failure, and who were candidates for obligatory surgical treatment.

In urological practice, it is a common enough experience to be confronted with a patient who is urgently in need of the relief of urinary obstruction due to prostatic enlargement of many years' standing. Uræmic and acidotic, he has a precarious future whether he is managed by catheterization, by suprapubic cystostomy or by immediate resection. Can we perhaps improve his prospects a little by an immediate dialysis? We can certainly hope to lower his blood urea and potassium levels and to achieve correction of his acidosis, however transient. On the face of things, it seems a reasonable enough proposition, and we should very much like to exchange a drowsy old man with air hunger and muscular twitchings for one who showed no clouding of consciousness and a more normal blood chemistry.

There is little recorded experience of the usefulness of the artificial kidney in this way. The Leeds unit mentioned only one in their paper in 1957 (Parsons and McCracken, 1957). We, too, have had the opportunity of attempting this on one occasion only.

The patient was a man, aged 66 years, with an 18 months' history of prostatism and retention of urine with overflow. He was very confused and anæmic, and severely acidotic. His blood urea content was 260 mg. per 100 ml. The biochemical improvement following an eight-hour dialysis was not matched by any betterment of his clinical state, and he failed to weather a transurethral resection two days later. At autopsy there was evidence of severe and long-standing back pressure on the ureters and kidneys.

Perhaps the risk to such a patient is more one of terminal blood-borne infection of kidneys made vulnerable to this complication by long-standing obstruction. Perhaps there is some danger in correcting a low bicarbonate level. May it not be that our patient's metabolism had become adjusted to an acidotic state, and that its hasty correction was not entirely salutary?

Perhaps to wait for a dialysis is only to waste precious time, and we might be better employed pressing on with the fundamental problem of relieving the obstruction.

To these questions we do not pretend to know the answer; but we believe that dialysis is probably worth a trial for poor-risk subjects with renal failure before operation, and we hope to widen our experience in this direction as the opportunity presents.

We have had one other essay in the field of pre-operative dialysis.

This patient was a woman, aged 54 years, who five months previously had lost one kidney, which was hydronephrotic and non-functioning. There was a mild degree of hydronephrosis on the other side. Five months later, and for no obvious cause, she developed anuria, and came to our unit six days later, when her blood urea level was 185 mg. per 100 ml. A ureteric catheter could not be negotiated into the pelvis of the ureter, but the urinary flow was restarted after pyelostomy. A subsequent pyelogram showed a kinking of the pelvi-ureteral junction, and pyeloplasty was advised. In an attempt to lessen the risk of operation, she was submitted to dialysis, the blood urea level being lowered first in this way to 40 mg. per 100 ml. The subsequent operation three days later went well and she made an excellent recovery; but we are still in some doubt as to how much the dialysis contributed to this happy outcome.

We also held our machine in readiness during the days that followed removal of a massive staghorn calculus from the kidney of a young man, aged 24 years. He had been troubled by recurrent nephrolithiasis since the age of four years, and had had 11 previous operations on one or other side. He had very poor function in the affected kidney, and a small stone and minimal function on the opposite side. It was clear that he had very little renal reserve, and after operation his blood urea level rose from 35 to a maximum of 260 mg. per 100 ml. He eventually made a good recovery, and dialysis was not deemed necessary.

We have also been called in several times to help in the care of patients after urological operations. One was a patient who went into renal failure after a prostatic resection; but the picture was complicated by continuing

hæmorrhage from the prostatic bed, and we were reluctant under these circumstances to run the risk of urgent bleeding following the heparinization that is necessary during the period of dialysis. There is always likely to be this difficulty in coupling to the machine any prostatic patient after operation, and we are inclined to believe that, if it has any place as a useful ancillary for the bad-risk patient, it is most likely to be in the pre-operative period.

However, we have been induced to treat two patients who went into renal failure after operations on the renal tract.

The first was a man, aged 52 years, who was mildly diabetic. He came to hospital with left renal colic and anuria. The right kidney had been removed three months earlier because of a large calculus. The urinary flow was reestablished by ureteric catheterization and transvesical ureteric meatotomy, but the obstruction then promptly recurred, and two weeks later a difficult nephrostomy was attempted. However, this never functioned really satisfactorily, and he developed the signs of progressive renal failure. When he was admitted to our unit he was drowsy and acidotic. There was a pericardial friction rub, and his blood urea level was 255 mg. per 100 ml. This was reduced to 100 mg. per 100 ml. by an eight-hour dialysis, and he made good progress for some days. Although his urinary output remained adequate there were further difficulties with the nephrostomy. His general condition deteriorated, and at autopsy the kidney was found to have been replaced almost completely by multiple abscess cavities.

The second is one of our most recent cases. The patient is a young man, aged 16 years, who had congenital absence of one kidney and a moderate degree of hydronephrosis in the other. After a pyeloplasty, he went into renal failure and developed evidence of a bleeding diathesis. On his admission to our unit he was stuporose, twitching and acidotic, and his blood urea content was 350 mg. per 100 ml. The skin over his chin was raw from repeated vomiting, and he had severe anæmia. On the day after his admission to hospital he was given a ten-hour dialysis at a very high rate of flow. Not only was there gratifying biochemical improvement, but it triggered off a satisfying diuresis, and within 24 hours he was restored to consciousness. He continues to make progress, but still has a somewhat precarious hold on life.

The management of acute renal failure when the kidney has previously been healthy is an entirely different problem, and this is the one which largely occupies our attention. It is precipitated by a variety of agencies, not all of which are clearly understood. Often many different factors are operating, and it is impossible to make more than a guess at the part that each one plays. It has been to me a matter of surprise that the majority of our patients with acute renal failure have come to us from surgical and obstetric units rather than from medical units. In a high proportion of cases anuria has followed operation or injury in which there has been for a time a substantial fall in blood pressure, whether due to uncontrolled bleeding or to its too slow correction. This, in surgical practice, is by far the commonest cause of acute oliguric renal failure.

Of the three patients we sent to Sydney for dialysis, one developed his anuria after a gunshot wound of the chest, and the second as a sequel to a traumatic amputation in a train accident. There was in each case a protracted episode of hypotension.

Kolff (Keleman and Kolff, 1958) reported that of 38 cases of acute renal failure from all causes in which dialysis was undertaken, injury was the cause in five and operation in 12.

Mismatched blood transfusion, despite the exercise of the very greatest care, still occurs from time to time; most often it is due to Rh incompatibilities.

We have had only one patient in this group, a young married woman, who developed severe post-partum hæmorrhage and was given in all 14 pints of group O, Rh-positive blood, her correct group being O, Rh-negative. This was promptly hæmolysed, and she became severely anæmic and deeply jaundiced. The systolic blood pressure fell to very low levels over many hours, and the flow of urine virtually ceased. In the face of a rising blood urea level, severe acidosis, a high serum potassium level and confusion, she was given a ten-hour dialysis. This lowered her blood urea level from 390 to 210 mg. per 100 ml. and initiated excellent diuresis, which was maintained. She made what was apparently a complete recovery.

It so happened that, at the same time, we had a not dissimilar problem to solve at the Royal Melbourne Hospital.

The patient was a man in his sixties, who gave a long history of dyspepsia, and who had been in hospital on two previous occasions with hæmatemesis, which was treated conservatively by transfusions of group A blood. He was admitted to hospital on this recent occasion with another severe stomach hæmorrhage, and this continued so that he was submitted to an emergency gastrectomy. He received in all 14 pints of group A, Rh-positive blood, which was on each occasion cross-matched against a week-old serum sample. On the second day after operation he was as yellow as a guinea, and his hæmoglobin value was 45%, although no more hæmorrhage occurred. His blood was rechecked and was found to be group A, Rh-negative. Anti-Rh antibodies were discovered in the serum. The interesting thing from our point of view is that his urinary ouput during the first three days after operation was 1 to 2 litres or thereabouts, and on the fourth day he passed over 2 litres. His jaundice promptly subsided, and at no stage did he have any general symptoms attributable to the transfusion.

The benignity of the clinical course as far as his kidneys were concerned was in striking contrast to our post-partum patient, who had received the same amount of incompatible blood, but had been precipitated into immediate and complete renal failure.

Damage to the kidney appears to be almost inevitable if there is at any time a fall in blood pressure, whether this is due to the cause which first made transfusion necessary, or whether it is a part of the reaction to the administration of incompatible blood.

The renal failure which may follow urgent hæmolysis due to other causes is probably no different in its pathogenesis. This type of reaction has been reported occasionally when a hypotonic solution used in irrigation during a transurethral resection gains access to the blood-stream, presumably through the open venous channels of the prostatic plexus.

Another cause, which has not featured in our series, is crushing injury, in which there is a liberation of myohæmoglobin.

We have accepted for dialysis one patient with acute tubular necrosis due to burns. She was a young child, aged nine years, with deep burns involving 35% of the skin surface. An attempt was made at dialysis, but she was moribund at this time, and her circulation was almost totally arrested. At autopsy the presence of severe renal damage was confirmed; but the terminal collapse was due to the undetected perforation of a large Curling's ulcer.

We have met with acute renal failure as a fatal sequel to acute pancreatitis. It is a lethal complication, which is more common than I had hitherto suspected. In this case dialysis was delayed too long, and our patient died while still coupled to the machine.

We have treated two patients with oliguria in association with septicæmia.

In the first case the condition developed as a sequel to an acute mammary infection in the puerperium. The patient came to us when the anuria had been present for five days and the blood urea content was 315 mg. per 100 ml. Excellent diuresis followed dialysis, and she made a prompt and complete recovery.

In the second case, oliguria developed in association with an infection of an operation wound for stripping of varicose veins. Despite adequate treatment in the patient's local hospital, her serum bicarbonate level on her admission to hospital on the fifth day of anuria was only 6 mEq/l., and the blood urea level was 350 mg. per 100 ml. Gross anæmia was also present. Her clinical and biochemical condition improved considerably after dialysis, but this improvement was not sustained, and she died 11 days later. The immediate cause of death was a pulmonary embolus originating in the inferior vena cava at the site of a "Polythene" catheter used for continuous intravenous infusion.

The pathological finding in the kidney was the same in each of these cases—acute tubular necrosis.

The indications for dialysis are now established and fairly widely accepted. The artificial kidney should be used only when, despite adequate conservative therapy, the following conditions apply: (*a*) the serum potassium level rises to 7·5 mEq/l. or more; (*b*) there are electrocardiographic changes of hyperkalæmia; (*c*) the serum bicarbonate level has fallen to 10-12 mEq/l. or less; (*d*) the blood urea level has reached 400 mg. per 100 ml. or more. Any single one of these values can be made the reason for dialysis. However, our experience suggests that decline in the clinical state is even more important than biochemical values; but this is, of course, more difficult to measure in an objective way.

The initiation of what may seem a worthwhile diuresis does not necessarily signify that the need for dialysis has passed. Our Kolff machine has proved itself to be an efficient dialysing unit, and we can now confidently predict at the end of a six-hour dialysis a correction of the electrolyte pattern and a profound fall in the blood urea level. The manœuvre cannot be without risk, but our first efforts have been surprisingly trouble-free. So long as the cannulation goes off well and a good flow rate is maintained through the kidney circuit, bleeding and clotting present no problem. One of our patients, at autopsy, had a small subdural hæmatoma, but we had no direct evidence to suggest that it was due to heparinization. Nor have we encountered pulmonary œdema.

This growing confidence is, I believe, inclining us now to plead the case for rather earlier dialysis. Early in our series we allowed a young woman, aged 30 years, to slip through our fingers. She succumbed to acute tubular necrosis, a sequel to a bout of severe hypotension immediately following an operation for the resection of a colon cancer. We lost another after a traumatic rupture of the pancreas. We nearly lost a young woman who developed renal failure as a sequel to a gas infection of the endometrium following an abortion.

It is happily now our experience that, as we wheel our patient to the machine, we are less often than of old tempted to look back over our shoulder to make sure that we are not being followed by the undertaker, and, what is even more gratifying, when we arrive on the scene early, we now do so in the willing company of our physician colleagues.

I think the time is not far distant when we shall consider dialysis when it is not obligatory to preserve life, but in the expectation that we can make the clinical course of the disease more benign and so shorten convalescence. If, a year ago, I was slightly sceptical of the role of an artificial kidney, I am now in no doubt whatsoever of its life-saving value in selected cases. It is inevitable that, in setting up an artificial kidney unit, one should attract a clientele of patients many of whom are totally unsuited for dialysis; but we can now confidently expect to pick from this number a significant total of successes.

Interest in this problem has also served to highlight for me our complete ignorance of the cause and control of the ravages of chronic renal disease. It is inevitable that our attention should be drawn increasingly to the exciting possibilities of a dialysis more biological and more permanent than our "Cellophane" sausage skins can offer—namely, a permanent renal homotransplant.

Solution of the fundamental immunological problems which meantime thwart our progress in this direction will open up new vistas in the treatment of chronic renal disease; but I still believe that our kidney even at this stage will not go entirely out of business.

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SOME ASPECTS OF RENAL TUMOURS.[1]

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IN the term renal tumours I do not include the transitional and squamous-cell carcinoma arising in the renal pelvis or the Wilms's tumour—that is, embryonic adenosarcoma.

The late results of the operative treatment of renal tumours have not appreciably improved during the last 30 years. In 1932 I presented Einar Key's series of 58 patients with renal tumour operated on during the years 1910 to 1928. Out of 24 patients operated on more than 10 years before, no fewer than 11, that is, 45·8%, were alive at the time of the follow-up examination. The reason why the results now in general are not so good is partly that, in many places, nephrectomy is carried out on patients with metastases and also on patients formerly considered inoperable. In my clinic it now rarely happens that a renal tumour is explored without nephrectomy.

Curiously enough, another reason is, in some degree, the improvement in diagnosis. I am thinking of the patients with renal tumour without hæmaturia, but with general symptoms, such as a raised temperature, a high erythrocyte sedimentation rate, etc. Thanks mainly to urography and angiography, an increasing number of such cases are now diagnosed at medical clinics, where as in the past they were not infrequently first recognized at autopsy. In our experience the prognosis in such cases is often bad. Because these patients are now in a great number submitted to nephrectomy, the results in series of nephrectomies have become worse. For instance, Jonsson and Truedsson (1957) have recently shown that, out of 43 patients with renal tumour who were admitted directly to the surgical clinic in Lund and submitted to nephrectomy, 49% were alive five years after operation, whereas of 17 patients transferred from the medical to the surgical clinic only four, that is, 23%, were alive five years after nephrectomy.

Renal tumours can be considered as a series, ranging from tumours of no importance to their hosts, such as those often discovered *post mortem* by pathologists, to tumours of the greatest clinical and anatomical malignancy which, if left to themselves, soon scatter metastases throughout the body and kill their host.

Between these extremes there are remarkable tumours which differ strikingly from malignant tumours in other organs by their prolonged course, their late break-through, their enveloping capsule, and the slightness of their toxic effects. The first symptoms may have appeared six, eight, ten or even 20 years back, and the tumour may have reached a considerable size, yet there may still be no sign of cachexia. Even after decades of apparent harmlessness the tumour may, however, suddenly become malignant and cause death. This change to malignancy may occur even after the tumour has undergone very extensive retrogressive changes, with calcification and metaplasia to bone tissue.

A very interesting point is that Hultquist (1944) has shown that in small hypernephromata a spontaneous regression may lead to the complete breakdown of the hypernephromatous tissue, leaving a scar of typical morphological appearance. Among other things, he states that:

> In contrast to the development of connective tissue caused by the organization of hæmorrhages, which is focal and sporadic, a hypernephroma often shows a more gradual and diffuse proliferation and hyalinization of the stroma, pushing the groups of tumour cells further and further apart until it seems as if only isolated, degenerate cells lie scattered in the connective tissue.

[1] Read at the twelfth annual general meeting of the Urological Society of Australasia, Melbourne, March, 1959.

Hultquist presented 17 autopsies in cases of hypernephromata up to twice the size of a hazel nut, in which spontaneous regression of the tumour had occurred. In four cases, judging by the serial sections, the epithelial elements of the hypernephromatous tissue had completely disappeared. In six cases there were a few cells, or small groups of cells, which resembled those of hypernephroma; but they could not be diagnosed as such with certainty, because some of them showed extensive regressive changes. In seven cases there was undoubted hypernephromatous tissue, but here, too, the hypernephroma cells showed definite, sometimes advanced, regressive changes. The fact that small hypernephromata may regress completely is of great interest, not least because cases have been reported in which pulmonary metastases, present before operation, disappeared completely after nephrectomy (Mann, 1948; Arcomano, Barnett, and Bottone, 1958), or in which pulmonary metastases appeared post-operatively in a previously clear lung, and then disappeared (Bumpus, 1928; Beer, 1937).

I shall here describe a case in which histologically verified, multiple metastatic nodules in the lungs disappeared spontaneously, without removal of the primary tumour in the kidney.

The patient was a man, born in 1922, who presented to the ear, nose and throat department of the General Hospital of Vasteras because of headache and giddiness, the cause of which could not be found. In September, 1956, X-ray examination (Dr. Renander) showed miliary shadows, up to twice the size of peppercorns, scattered diffusely in both lungs, and also some larger shadows with blurred outlines at the base of the lower lobe of the left lung. Besides these, there was a shadow at least the size of a walnut in the right hilar region. Two weeks later, X-ray examination showed an increase in the miliary dissemination. In November, 1956, exploratory thoracotomy was performed by Dr. Rudstrom. Nodules varying from the size of a grain of corn to almost that of a hazel nut were felt over the whole surface of the lung. Biopsy specimens were taken at three points. Histological examination showed that these were metastases of a hypernephroma. Renewed X-ray examination (Figure I)[1] about a week later showed that the metastatic nodules had grown to about the size of hazel nuts, but the shadows in the lower lobe of the left lung had decreased somewhat in size. The patient had no urinary symptoms. Urography showed broadening of the upper part of one kidney, so a renal tumour was suspected. In view of the metastases in the lungs, the surgeons refrained from nephrectomy.

In March, 1957, the patient had hæmaturia, and an angiographic examination performed on this account showed a well-vascularized tumour in the right kidney. A renewed X-ray examination of the lungs was carried out on March 22, 1957 (Figure II)—that is, three and a half months after the previous one. This showed complete disappearance of the metastatic nodules in the lungs, but the nodule in the right hilar region remained.

On May 7, 1957, nephrectomy was performed by Dr. Bruzelius. A tumour the size of a fist was found in the right kidney. At histological examination hypernephroma was diagnosed.

On September 18, 1957, because of giddiness and headache with papilœdema in the left eye, angiography of the left common carotid was carried out (Figure III). This showed that there was a remarkably vascular, rather rounded tumour, the size of a mandarin orange, in the left frontal lobe, containing very numerous vessels with remarkably rapid arterio-venous shunting of the contrast substance. The anterior cerebral artery was displaced about 1 cm. to the right of the middle line. The tumour in the frontal lobe had infiltrated and destroyed the base of the skull in the anterior cranial fossa over an area nearly the size of the tip of the thumb, to the left side and a little in front of the sella turcica. From September 25 to October 26 the brain metastasis was given X-ray therapy in a fairly small dose. Treatment was given over three fields: (i) the right side of the skull, with the rays aimed directly downwards; (ii) a left frontal field with the rays directed slightly upwards; (iii) over the vertex, with the rays in a sagittal direction. A dosage of 2700*r* was given in each field.

On January 10, 1958—that is, a good two months after the end of the X-ray treatment—a further angiographic examination was made (Figure IV). There were no abnormal vessels at the site of the metastasis seen on the previous occasion. In its place there was now a poorly vascularized region in the frontal lobe, suggesting that the metastasis had become necrotic. The anterior cerebral artery, which had been considerably displaced, now lay practically in the middle line.

From January 13 to 30, 1958, the nodule in the right hilar region was treated with X rays, and on May 7, 1958, X-ray examination of the lungs showed that it had become somewhat smaller. Apart from this, the radiological picture of the lungs had not changed since the previous examination.

The patient died on December 3, 1958. Post-mortem examination showed no metastases in the lungs except one twice the size of a walnut in the upper lobe of the right lung, near the hilum. A neighbouring gland in the mediastinum was involved by the tumour. Apart from this, there was a metastasis the size of a Spanish nut, and another the size of a golf ball, in the remaining kidney. An interesting point was that the metastatic lesion in the frontal lobe of the brain was necrotic. The stroma showed the structure of a hypernephroma, but no tumour cells could be found. In the cerebellum, however, there was a cyst the size of a golf ball, into which a tumour the size of a cherry projected. Everything suggests that this was also a metastasis, though it showed on histological examination a rather more irregular structure than the metastasis in the lung. It is probably this tumour which caused the giddiness which led the patient to consult a doctor three years before his death.

In this case, there were multiple pulmonary metastases, all but one of which disappeared spontaneously. In addition, there was complete regression of the tumour in the frontal lobe of the brain after X-ray therapy in a moderate dose.

With regard to the symptoms of renal tumours, I should like to say a few words about hæmaturia. Hæmaturia is, in most cases, due to a hæmorrhage in a tumour which has ruptured into the renal pelvis. More rarely, it is due to congestive venous hæmorrhage from the mucous membrane of the pelvis. The congestion in these cases may arise from compression of veins by an internally situated tumour, or growth of the tumour into the veins. In all cases of renal tumour in which hæmaturia has occurred, it is therefore to be expected that urography will reveal changes. It is really only when the kidney is abnormally situated or when it is congenitally malformed that the tumour sometimes cannot be detected by urography.

Renal tumours which do not lead to hæmaturia may not cause changes in the renal pelvis. They may then be hard to detect with intravenous urography, and may be revealed only by angiography.

Olhagen reported a case of this kind in 1952. The patient was a man, aged 47 years, who complained mainly of general ill-being and fatigue, but also of a dry cough. A thorough medical examination was made, but nothing definite was found, except that the sedimentation rate was greatly elevated—to 1200 mm. in one hour. Electrophoretic examination of the protein fractions in the serum showed abnormally large quantities of alpha globulins, as well as a large quantity of fibrinogen. Urographic examination was performed six times during 1951 and 1952, but no signs of tumour were seen. Aortography, performed in May, 1952, disclosed a filling defect the size of a hen's egg in the upper pole of the right kidney during the nephrographic phase. Nephrectomy was performed, revealing a hypernephroma barely the size of a mandarin. After the operation, the sedimentation rate returned to normal, and likewise the electrophoretic diagram. Six years after the operation the patient was still alive and well.

As we now include urography in the routine examination of most urological patients, it not infrequently happens that we discover an expansive renal process, but it is often not possible to determine whether it is a cyst or a tumour. Edsman, of the Röntgen Diagnostic Department I of Sahlgren's Hospital, Gothenburg, has dealt with this question in some detail in a recently published work entitled "Angionephrography and Suprarenal Angiography". He shows that renal angiography can be very useful in such circumstances. He states that:

> A common feature of simple renal cysts is that they lack pathological vessels at the angiography and appear as a more or less pronounced parenchymal defect. The cyst causes an arched displacement of the vessels, but their course is regular as well as their lumen.

[1] For Figures I, II, III and IV see art-paper supplement.

In the vast majority of cases of malignant tumour, Edsman found abnormal vessels. In cases of sparsely vascularized or avascular tumours it was still generally possible to make the differential diagnosis, because during the nephrographic phase a cyst appears as a homogeneous defect in the renal parenchyma, whereas the degree of contrast density may vary in different parts of a tumour. The demarcation of a cyst from the parenchyma is sharp, whereas that of a tumour may be irregular. However, in rare cases it is impossible to make a sure differential diagnosis between cyst and renal tumour by means of angiography.

It seems that we now have a test at our disposal, which in most cases enables us to make a differential diagnosis between cyst and tumour of the kidney, without performing angiography in cases in which urography shows the presence of an expansive process. This is determination of the C-reaction protein—that is, performance of the C.R.P. test.

In 1947 Per Hudlund reported the results of an assessment of this test in a series of 2000 patients. He showed it to give a positive result in a large proportion of cases of infection, pulmonary disease and upper respiratory tract infections. In cases of tumour the results were variable. For instance, the test gave negative results in three cases of cancer of the pancreas, and of 11 cases of cancer of the stomach it gave positive results in only four; but in six cases of hypernephroma the results were positive in all cases. Lofstrom performed the C.R.P. test in one case of hypernephroma in 1943, and here, too, it gave positive results.

In our series of cases of renal tumours this test gave positive results in all cases in which it was carried out. The following case shows that it also gives positive results with small renal tumours.

A man, aged 61 years, with hypertension, had microscopically evident hæmaturia. Urography showed an increased interval between the lower and middle calyces. The middle calyx formed a slightly concave curve, suggesting an expansive process in the kidney. Was it a renal cyst, or a tumour? Angiography showed abnormal vessels in this area, and the diagnosis of tumour was made. On exploration of the kidney, no tumour was to be seen or felt; but we relied on the X-ray findings, and performed a nephrectomy. The tumour was the size of a walnut. The C.R.P. reaction was positive in this case.

In all cases of renal cyst in which we have applied the C.R.P. test the result has been negative, and in all cases of renal tumour it has been positive. Therefore I think, from our present experience, that we can in general exclude a tumour if the C.R.P. test produces a negative result, and need not carry out an angiographic examination in such cases when urography has revealed an expansive process.

An interesting question is whether we can exclude the occurrence of metastases if this test gives negative results after nephrectomy. My collaborators, Ralf Pompeius and Stig Holm, are carrying out this test on a large scale in connexion with the follow-up investigation of patients. In cases in which nephrectomy has been performed and metastases have been found and not removed, the result of the C.R.P. test has remained positive, though the titre may have been lowered after the operation. In cases in which we have performed nephrectomy and there were no signs of metastases, the result of the test has been negative some time after operation. It is interesting that in the case of renal tumour described by Lofstrom in 1943, in which the result of the test was positive before nephrectomy, it was negative two weeks and one month after operation. The patient died from heart failure 14 years after nephrectomy, and autopsy showed no trace of metastases.

We have, however, recently observed a case of renal tumour with pulmonary metastases, in which the result of the C.R.P. test was negative three months after nephrectomy; but in this case there had been a marked regression of the pulmonary metastases at the same time.

The patient was a man born in 1905. In the summer of 1958 he complained of cough and a feeling of constriction of the chest. On August 11 X-ray examination revealed about ten rounded shadows in both lungs, with blurred outlines, from the size of a pea to that of a walnut. Angiography revealed a tumour in the left kidney. A C.R.P. test performed on September 4, 1958, gave positive results, and on September 11 the patient was submitted to nephrectomy. Histological examination of the specimen showed hypernephroma of grade II malignancy. The renal vein was involved. A C.R.P. test carried out on September 23, and another on October 9, both gave positive results. On November 25, 1958, X-ray examination of the chest showed remarkable regression of the metastases in the lungs. In the sixth right rib there was a rarefied area the size of a haricot bean, probably a metastasis. On December 3, 1958—that is, three months after nephrectomy—further regression of the pulmonary metastases had taken place. All that was left were a nodule the size of a pea in the lower lobe of the right lung and one the size of a hazel nut in the lower lobe of the left lung behind the heart. On January 5, 1959, the C.R.P. test gave negative results, and on January 27, 1959, X-ray examination of the lungs showed further regression of the metastases. Now all that remained was the small nodule in the lower lobe of the right lung. Thus in this case, too, pulmonary metastases disappeared almost completely.

However, nothing seems to be 100% in medicine. Two weeks before I left Gothenburg, after I had written this paper, I saw a case of renal tumour in which the C.R.P. test result was negative on the first occasion.

The patient was a man, aged 81 years, who was admitted to my department on January 20, 1959, because of symptoms of prostration caused by a benign prostatic hyperplasia. There was no hæmaturia, but urographic investigation revealed an expanding lesion in the upper pole of the left kidney, which was shown by angiography to be a highly vascular tumour. Analysis of the blood showed a slight increase in fibrinogen content (0·60%), and the alpha globulin levels were slightly above normal. On January 21 the C.R.P. test gave a negative result, but on January 26 the result was positive. On January 28 nephrectomy was performed, revealing a tumour the size of a mandarin in the upper pole of the kidney.

We are investigating this case further. It is the only case in which we have seen a negative response to the C.R.P. test in a case of renal tumour. I shall now return to the question of how angiography can demonstrate metastases from renal tumours.

Chidekel and Obrant (1957), from my clinic, have recently reported two cases in which metastases were demonstrated by pelvic angiography. In both cases renal angiography was performed by the method of Seldinger, with a catheter advanced from the femoral artery, and in both cases a renal tumour was found. After the injection of contrast medium into the aorta at the origin of the renal arteries, the catheter was withdrawn so that the catheter tip came to the level of the aortic bifurcation. A further injection of contrast medium was given.

In the first case (Figure V), pelvic angiography disclosed several lesions of varying size with abnormal vessels of the same character as in the renal tumour; the largest, measuring 9 cm. by 7 cm., was located in the ilium, close to the sacro-iliac joint. The next largest was in the left femoral shaft. Similar, but smaller, lesions were observed in the left ilium and the left ischium, immediately above and medial to the right acetabulum, and in the upper part of the sacrum. On plain X-ray examination of the pelvis, areas of bone destruction were found at the sites of the two largest metastases. The others were revealed only by pelvic angiography.

In the second case, pelvic angiography showed that in the anterior part of the pelvis minor, about 4 cm. above the pubic symphysis, there was a circumscribed heterogeneous contrast mass, measuring 22 mm. by 18 mm., and vascularized from the right internal iliac artery. Cystoscopic examination disclosed a pedunculated tumour in the upper posterior wall of the bladder. On May 24, 1957, the tumour in the bladder was extirpated. Histological examination showed it to be a hypernephroma metastasis.

We now come to the question of whether—or to what extent—the presence of metastases contraindicates nephrectomy in renal tumours. Since multiple pulmonary

ILLUSTRATIONS TO THE ARTICLE "MODERN TREATMENT OF RENAL TUBERCULOSIS", BY EINAR LJUNGGREN.

FIGURE I.

Specimen from a case in which partial nephrectomy was performed after a course of chemotherapy lasting seven months. Conversion occurred after one month's treatment. The cavity was in communication with the renal pelvis by a calyx with a narrowed lumen. It seemed to be largely due to back pressure. Histological examination showed signs of chronic non-specific infiltration in the mucosa lining the cavity. Only two disintegrating microscopical tubercles could be found, and there were no signs of other tuberculous lesions. In the calyx there were signs of non-specific infiltration and fibrosis (Ljunggren, 1959).

FIGURE II.

Urographic findings in a case of renal tuberculosis. Calyces are absent in the lower part of the pelvis, indicating that the lesions in lower pole are sealed off.

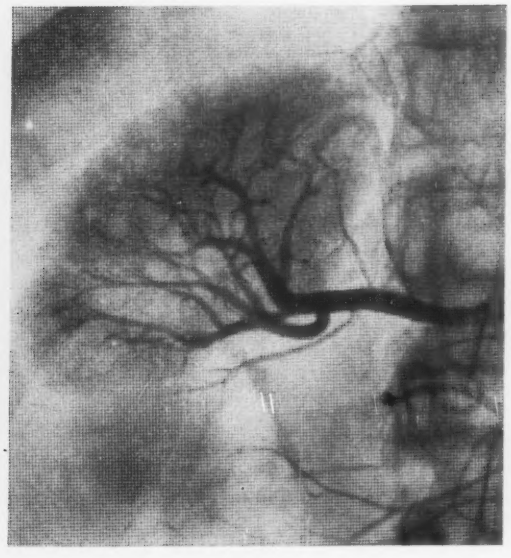

FIGURE III.

Angiographic picture in the same case as in Figure II. Poor blood supply to the sealed-off lesions in the lower pole of the kidney.

ILLUSTRATIONS TO THE ARTICLE "SOME ASPECTS OF RENAL TUMOURS", BY EINAR LJUNGGREN.

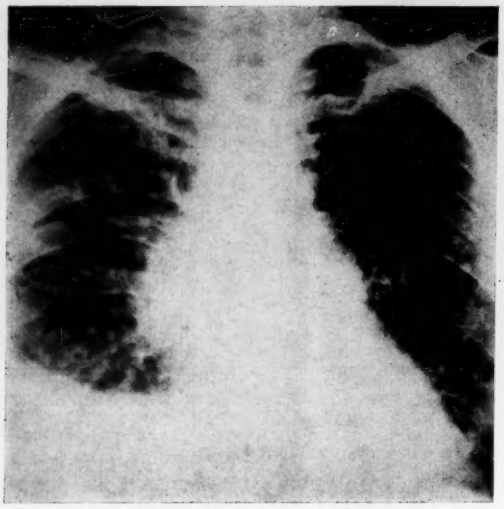

FIGURE I.

Metastatic nodules scattered diffusely in both lungs. In the right hilar region is a shadow the size of a walnut.

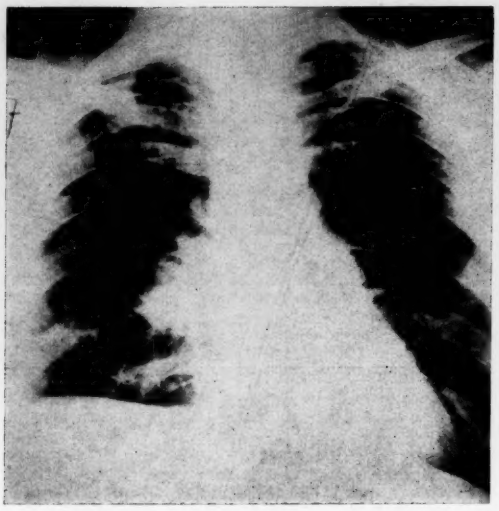

FIGURE II.

The metastatic nodules in the lungs have disappeared. The nodule in the right hilar region remains.

FIGURE III.

Angiogram of the left common carotid. A remarkably vascular tumour is seen in the left frontal lobe. The anterior cerebral artery is displaced about 1 cm. to the right of the middle line.

FIGURE IV.

Angiogram of the left common carotid in the same case as Figure III, taken about four months later. No abnormal vessels are seen at the site of the tumour in the left frontal lobe. The anterior cerebral artery is no longer displaced.

ILLUSTRATIONS TO THE ARTICLE BY R. G. COOPER AND P. E. HURST.

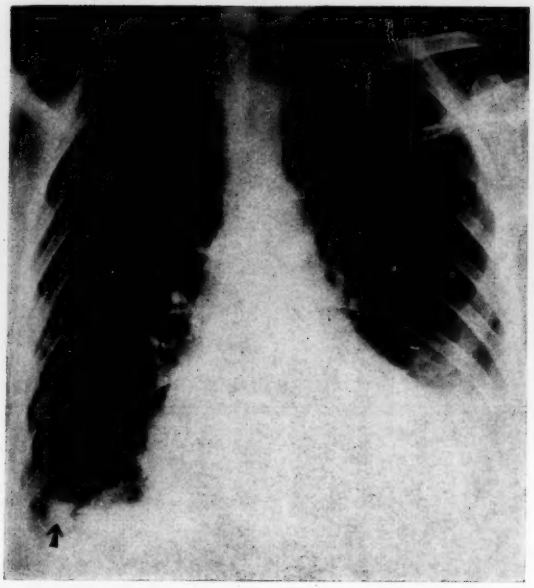

FIGURE I.

X-ray films of chest, showing cardiac enlargement and two rounded opacities (see arrows) in the right lower lung field.

FIGURE II.

Right ventricle, showing the small areas of endocardial thickening and the mural thrombus at the apex.

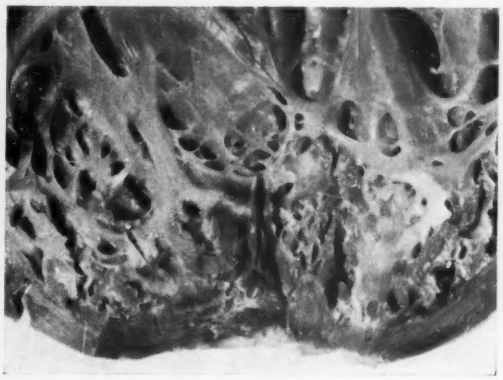

FIGURE III.

Left ventricle, showing endocardial thickening and fibrosis within the muscle.

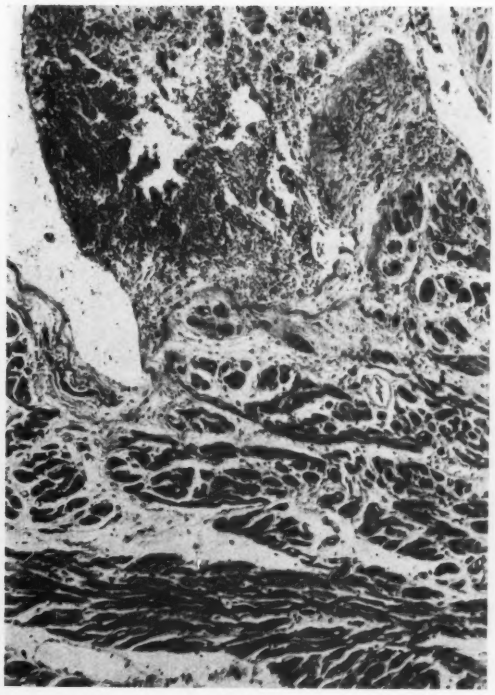

FIGURE IV.

Right ventricle, showing fibrosis of the endocardium and inner muscle layers. A mass of red cells and fibrin covered by a layer of endothelial cells is seen at the top of the photograph. (× 100, approximately.)

ILLUSTRATIONS TO THE ARTICLE BY R. G. COOPER AND P. E. HURST.

FIGURE V.

Left ventricle, showing bands of collagen between atrophic myocardial fibres. (× 300, approximately.)

ILLUSTRATION TO THE ARTICLE BY THOMAS FERRIER, PETER ROWE AND RONALD COX.

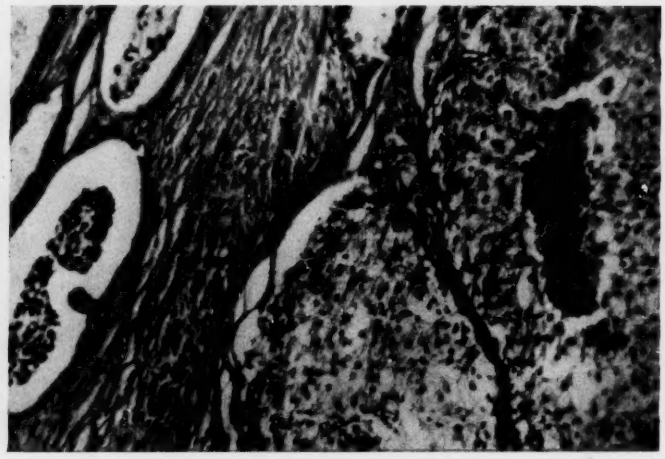

FIGURE III.

Edge of tumour, showing tumour cells lying in venous channels in the capsule.

metastases may disappear spontaneously, or the metastases may grow very slowly, I—like many authors—consider that the presence of pulmonary metastases does not contraindicate nephrectomy, especially if the renal tumour has given rise to severe hæmaturia or other troublesome symptoms. Neither do I regard solitary metastases in other organs as a contraindication to nephrectomy.

The surgical treatment of the metastases is another problem. Brain metastases are fairly common in renal tumours, considerably more so than in intestinal cancer. This is because the venous blood from the renal tumour runs directly into the inferior vena cava, and does not enter the portal circulation. In the liver, cancer cells in the blood may be destroyed, or else they are arrested and give rise to secondary growths. In the Scandinavian countries a fairly large number of intracranial metastases of renal tumours have been extirpated. Christensen (1949) reported six cases from the neurosurgical clinic at Rigshospitalet in Copenhagen. In at least three of these the cerebral metastasis was the first sign of the renal tumour. Three patients died immediately after operation, and one died later. One patient was alive, with other metastases, six months after the operation (the renal tumour was not removed).

The sixth case is very interesting. It is that of a man who had been subjected to a left nephrectomy for hypernephroma nine years before his admission to the neurosurgical clinic. Histological examination of the intracranial tumour removed also showed the typical picture of hypernephroma. At a follow-up examination three years later, he was completely free from symptoms and fully able to work. He died four years later, that is, seven years after the brain operation and 15 years after nephrectomy, from carcinoma of the rectum. This was regarded as a primary tumour having no connexion with the hypernephroma.

At Olivecrona's neurosurgical clinic at Stockholm, Stortebecker reported in 1954 that intracranial metastases from renal tumours had been removed in 27 cases. The metastatic hypernephroma was generally easily enucleable. Nine of the patients (Table I) died within three months

TABLE I.

Survival Period after Intracranial Operation for Metastatic Hypernephroma in 27 Cases (Stortebecker, 1953).

Survival Period.	Number of Cases.
20 days	5
20 days to 3 months	4
3 to 6 months	2
6 months to 1 year	7
1 to 2 years	5
2 to 3 years	2
4 to 5 years	1
15 years	1
Total	27

of the operation, but four were alive more than two years after the operation, and one was in tolerably good health 15 years after the operation.

I think these results suggest that an attempt should be made to remove the brain metastasis, at least in cases in which there seems to be no other metastasis in the body. For reasons already given, however, pulmonary metastases need not contraindicate the brain operation.

I should like to discuss some of the cases in which we have removed metastases of renal tumours. In some the metastasis caused the first symptoms of the renal tumour, and it was only on histological examination of the metastasis that the primary growth in the kidney was detected. In two cases a total pulmonectomy was carried out.

The first patient, a man, aged 59 years, presented in December, 1954, complaining of pain in the left side. X-ray examination revealed a large effusion in the left pleura and an expansive process in the left lung. On May 4, 1955, a left pleuro-pulmonectomy was performed, with removal of parts of the pericardium and diaphragm to which the tumour had extended. After a pathological examination, a diagnosis of hypernephroid tumour was made. Examination of the kidney was postponed because of the poor condition of the patient. In December, 1955, hæmaturia occurred, and an X-ray examination revealed a tumour of the left kidney. On February 10, 1956, a left nephrectomy was carried out, and a diagnosis of hypernephroma of grade III malignancy was made after a pathological examination. The patient died in June, 1956. At autopsy metastases were found in the myocardium and in the bronchial lymph glands. In this case, in which the tumour was highly malignant, and the metastasis in the lung had spread to the pleura, pericardium and diaphragm, operative treatment was unsuccessful.

The second case was that of a woman who underwent right nephrectomy in December, 1942, at the age of 48 years. A tumour the size of an orange was found at this time. Histological examination revealed the presence of hypernephroma. In May, 1953, miniature radiography of the lungs showed a well-defined tumour laterally in the second left intercostal space. In May, 1956, X-ray examination of the lungs revealed a large-spotted, cauliflower-like shadow in the upper part of the left lung. In June, 1956, a left pulmonectomy was performed. Histological examination showed a probable metastasis of the hypernephroma.

In July, 1958, the patient's general condition was very good, and there was no sign of further metastases.

Thus, pulmonectomy was carried out 14 years after nephrectomy for renal tumour. Two years later the patient was quite well.

Finally, in December, 1954, a man, aged 49 years, underwent extensive resection of the thoracic wall for tumour, with resection of parts of the third to sixth ribs. He had been ill since September, 1953, with pain in the left shoulder and chest. He had no urinary symptoms and had been unable to work. The tumour specimen weighed 800 grammes. Pathological examination resulted in a diagnosis of hypernephroid tumour. In February, 1955, right nephrectomy was carried out and a hypernephroma of grade II malignancy was discovered. Between October, 1955, and July, 1957, the patient returned to his work. In July, 1957, hæmaturia occurred. X-ray examination showed metastases in the remaining kidney. Exploration of the left kidney was carried out in October, 1957. Planned resection of the renal tumour was abandoned, as there was a metastatic nodule in the liver. In this case the patient's condition was considerably improved by removal of the metastasis in the thoracic wall, and the patient was able to return to work for two years.

In one case we removed an apparently solitary metastasis from the liver a good three and a half years after nephrectomy for a renal tumour.

The patient was a man, aged 65 years, on whom nephrectomy was performed in 1954. Histological examination showed a hypernephroma with marked regressive changes. In April, 1958, the greater part of the left lobe of the liver, containing a metastasis the size of a mandarin orange, was removed (Dr. Lewin). No other apparent metastases were present in the abdominal cavity. Four months later, in August, 1958, a C.R.P. test gave negative results, so we hope that no more metastases are present.

These are some examples of cases in which metastases were removed. I think this should be done especially in cases in which the primary renal growth is of grade I malignancy, and when there seems to be a solitary metastasis. The prognosis is probably best in those cases in which the metastasis shows itself many years after the removal of the primary tumour.

Many questions regarding renal tumours still remain unanswered. The spontaneous disappearance of pulmonary metastases may be due to an antibody reaction. My collaborators are at present studying how far metastases can be influenced by immuno-biological methods. It is possible that chemotherapy may be employed in association with nephrectomy, in order to destroy tumour cells which enter the blood-stream during manipulation of the tumour at operation.

I hope the prognosis of renal tumours, which is still rather gloomy, may become much brighter in the future.

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Reports of Cases.

DIFFUSE ENDOMYOCARDIAL SCLEROSIS: REPORT OF A CASE.

By R. G. COOPER AND P. E. HURST,

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OCCASIONALLY, in patients who have died of congestive cardiac failure, examination of the heart shows evidence of myocardial fibrosis associated with widespread endocardial fibrosis, for which no obvious cause is found. This condition, which appears to be distinct from that described as fibroelastosis or its synonyms, has been given many names. These include parietal endocardial sclerosis (Comeau, 1937), fibrosis of the endocardium and myocardium with mural thrombosis (Smith and Furth, 1943), endocardial fibrosis (Gray, 1951), constrictive endocarditis (McKusick and Cochran, 1952), and recurrent parietal thromboendocarditis (McNicol *et alii*, 1953).

The term "diffuse endomyocardial sclerosis" used by Lynch and Watt (1957) seems to us the most fitting. Cases corresponding to theirs have been described from Europe, America and South Africa. In Australia, Fowler (1947) has described two cases of a somewhat similar nature.

Recently such a case occurred in the Royal Perth Hospital, and because of increasing awareness of and interest in the condition it was thought worth while to record the clinical and pathological features here.

Clinical Record.

A female patient, aged 54 years, was admitted to hospital in October, 1956. Four years previously a routine X-ray examination of the chest had shown an enlarged heart. Two years later she developed dyspnœa and œdema, and these responded to treatment with digitalis and mersalyl. Thereafter she remained moderately well until four months before her admission to hospital, when dyspnœa and œdema recurred. In spite of treatment, she became increasingly dyspnœic and œdematous. For two months she had had a cough and for one week blood-stained sputum.

On examination of the patient, the presence of orthopnœa, cyanosis and mild icterus was noted. The pulse rate was 90 per minute, with an irregularity due to extrasystoles. The blood pressure was 100/85 mm. of mercury. The heart was enlarged, the apex beat being in the anterior axillary line in the sixth left intercostal space. A third sound was audible at the apex, but there were no bruits. The extremities were cold and cyanosed, the neck veins were engorged, and there was massive œdema of the lower limbs and of the abdominal wall and sacral region. Examination of the chest revealed a left pleural effusion. There was moderate ascites, but the liver was not palpable. The specific gravity of the urine was 1010, and albumin (1/16) was present. At this time the hæmoglobin value was found to be 18 grammes per 100 ml., and the packed cell volume (Wintrobe) 61%. Leucocytes numbered 6300 per cubic millimetre, the differential count being normal. X-ray examination of the chest revealed an enlarged heart with bilateral pleural effusions, that on the left being greater than that on the right. An electrocardiogram revealed extrasystoles, low voltage and left bundle branch block. The serum bilirubin content was 3·0 mg. per 100 ml., the serum alkaline phosphatase level 16·7 King-Armstrong units and the serum protein content 6·6 grammes per 100 ml. (albumin 2·8, globulin 3·8 grammes per 100 ml.). The serum glutamic oxalacetic transaminase level was 49 units per millilitre per minute (normal, less than 40 units), and the blood urea content was 25 mg. per 100 ml.

She was treated by means of salt restriction, digoxin and mersalyl. Aspiration of the pleural effusion was necessary, and incisions were made in the legs to allow the drainage of œdema fluid. During her stay of eight weeks in hospital she remained breathless and cyanosed; her blood pressure remained about 115/80 mm. of mercury.

Six days after her discharge from hospital she was readmitted because of vomiting and weakness. Again orthopnœa, icterus and cyanosis were noted. The blood pressure was 110/80 mm. of mercury, and the pulse was irregular. A third heart sound was present, the liver was enlarged and there was peripheral œdema. On this occasion the hæmoglobin value was 16 grammes per 100 ml., the packed cell volume was 51% and platelets numbered 220,000 per cubic millimetre. X-ray examination of the chest revealed a left-sided pleural effusion; two small rounded opacities were seen in the right lower zone (Figure I)[1]. An electrocardiogram revealed auricular fibrillation and left bundle branch block. The serum bilirubin content was 2·6 mg. per 100 ml., the serum alkaline phosphatase level 8·5 King-Armstrong units, the serum albumin content 2·4 grammes per 100 ml., the serum globulin content 3·6 grammes per 100 ml., and the bromsulphalein retention after 45 minutes, 33%.

[1] For Figures I to V see art-paper supplement.

During the remainder of her stay in hospital the patient's condition gradually deteriorated. She became increasingly weak and cyanosed, with an irregular pulse at times. One episode of painless hæmaturia occurred. The shadows in the right side of the chest radiograph persisted unchanged. There was no cough and no hæmoptysis. Death occurred six weeks after her admission.

Post-Mortem Examination.

Autopsy was performed six hours after death. The body was that of a thin, sallow, poorly nourished white female, 154 cm. tall. There was slight œdema of the arms, legs and sacral region, and a small sacral sore was present. The subcutaneous fat was only 0·5 cm. thick at the level of the umbilicus.

The heart weighed 425 grammes and it was relaxed. There were no pericardial adhesions or effusion; however, some small white opaque areas (milk spots) were seen in the epicardium over the left ventricle. The right atrium was moderately dilated, the wall being 3 mm. thick and trabeculation slightly prominent. The foramen ovale was closed, and the endocardium had a normal, smooth, glistening appearance. The right ventricle was moderately dilated, measuring 3 to 4 mm. in thickness at the outflow tract. At its apex were three flat, firm, white patches of endocardial thickening; each patch measured some 4 mm. in diameter; what appeared to be firm adherent ante-mortem blood clot was present near these patches (Figure II). The left atrium was moderately dilated, the wall being 2 mm. thick, and here the endocardium, while not obviously thickened, seemed a little more opaque than usual. The left ventricle showed considerable dilatation, and the wall was 15 mm. thick at the outflow tract. The most outstanding changes had occurred at the apex, where an area 4 cm. wide showed thick, white, firm, irregular opaque endocardial thickening. Firm ante-mortem blood clot appeared to be adherent to this area. At this site the wall was thin, but tough, and showed white, irregular streaking of the inner two-thirds of the myocardium. Elsewhere the changes were less marked; but especially near the septum, extending for some 7 cm. from the apical lesion, there were strands of white endocardial thickening and white streaking of the inner muscle layer (Figure III). Nearer to the aortic ostium, white discrete nodules of thickened endocardium some 4 to 8 mm. in diameter were present. The myocardium elsewhere was rather flabby, but had a normal colour and pattern. The valve leaflets of all four valves were thin and supple, even though both tricuspid and mitral valve orifices admitted four fingers.

The coronary ostia were patent. The coronary arteries were carefully dissected; they had patent lumens of regular calibre. The walls were amazingly thin and supple for the patient's age, and the intima appeared smooth. On macroscopic examination, no single patch of atheroma was observed even in the finest ramifications of the vessels. The aorta retained a fair degree of elasticity, and the intima was remarkably smooth; the major branches were similarly supple. The inferior vena cava and femoral veins appeared normal.

There were bilateral pleural effusions; 350 ml. of straw-coloured fluid were present in the left pleural cavity and 600 ml. in the right.

The lungs collapsed when the chest was opened. The left lung weighed 270 grammes and the right 310 grammes. The upper lobes were pale, feathery and dry. The lower lobes had a red cut face that was slightly tough, but no fluid could be expressed from them.

In the posterior basal segment of the lower lobe of the right lung there was an infarct 1 cm. in diameter. The trachea and bronchi appeared normal, as did the major pulmonary blood vessels.

The liver weighed 900 grammes, and was of small volume and elongated shape. The cut face showed large pale areas intermingled with smaller darker areas. The gall-bladder contained two faceted mixed calculi, each about 1·5 cm. in diameter, but was otherwise normal. The pancreas appeared normal. The alimentary tract appeared normal. The left kidney weighed 148 grammes and the right 170 grammes. Decapsulation was easy, and the surface was smooth. Within the cortex of the left kidney there was an area of ischæmic necrosis, 1 cm. in maximum diameter. Otherwise the kidneys appeared normal. The bladder occupied a cystocele, but otherwise was normal. Macroscopic examination of the genital system revealed no abnormality, apart from a cystocele. The spleen weighed 174 grammes and was dark red and firm. The bone marrow and lymph nodes appeared normal. The brain weighed 1173 grammes and appeared normal on macroscopic examination. The pituitary, thyroid and adrenals appeared normal.

Microscopic Examination.

Sections from various parts of the heart were stained with hæmatoxylin and eosin, and with Masson and elastic stains.

In the right atrium, myocardial hypertrophy and a slight increase in interstitial connective tissue were found.

In the right ventricle, at the outflow tract, small focal and linear areas of replacement fibrosis were present, and near some blood vessels a few histiocytes and plasma cells were found. The endocardium was of normal thickness in this region.

At the apex of the right ventricle patches of endocardial thickening were present, consisting of dense collagenous tissue containing a few disrupted elastic fibres and a few fibroblasts. In the deeper layers were sinusoids containing blood and surrounded by lymphocytes and histiocytes, some of which contained brown pigment. The interstitial connective tissue was increased, and in the inner layers of muscle were dense radiating bands of collagen. Sometimes histiocytes and plasma cells were found around blood vessels. What appeared macroscopically to be ante-mortem thrombosis consisted of masses of red cells and some fibrin, which in some places seemed to be covered by an intact layer of endothelial cells (Figure IV). This suggests that some of these areas, at least, are focal subendocardial hæmorrhages.

In other areas, especially in the left ventricle, the appearance is less suggestive of this, and here they were considered to be mural thrombi.

Examination of sections of the left atrium showed some collagenous endocardial thickening. In the left ventricle at its apex there was irregular patchy endocardial thickening, consisting of dense bands of collagen; a flattened layer of endothelial cells seemed to cover this. In other places the endocardium was quite thin. Elastic fibres were found in the deeper layers, and some reduplication of these was present.

Here and there in the deeper layers of collagen were numerous capillaries and sinusoids with prominent endothelium, surrounded by dense collections of lymphocytes, plasma cells and histiocytes. A few neutrophils were present also. In the inner layers of the myocardium were dense radiating bands of collagen, which occasionally reached the epicardium (Figure V). The myocardial fibres were in places swollen and pale, and often the nuclear outline was irregular. Some arterioles were thickened.

In the coronary arteries, only very slight intimal thickening was found.

The lungs showed some interstitial fibrosis, and many histiocytes of the "heart failure" type were present in alveoli. There was pronounced cellular and fibrous thickening of the pulmonary arterioles. Areas of intra-alveolar hæmorrhage were seen, and the nodule at the base of the lower lobe of the right lung was composed of a pale area of coagulative necrosis surrounded by vascular connective tissue. A few arteries near by contained ante-mortem blood clot.

The liver showed centrilobular congestion and atrophy. Collagenous connective tissue was found around central veins, and extended along sinusoids to link up with increased fibrous tissue about the portal tracts.

Examination of the kidney sections showed an old area of ischæmic necrosis in the cortex, and near by was an artery containing a partly organized thrombus. The arteries were thickened and showed some elastic reduplication. There was a slight increase in interstitial connective tissue with some glomerulosclerosis.

The pancreas showed some interstitial fibrosis and lobular atrophy. The arterioles were thickened. In the adrenal glands some focal cortical hyperplasia was present. The spleen showed chronic venous congestion. The pituitary and brain appeared normal.

Anatomical Diagnosis.

On the anatomical findings, the following diagnosis was made: cardiomegaly with endomyocardial sclerosis and mural thrombosis; chronic venous congestion of lungs, with an infarct in the lower lobe of the right lung; early cardiac hepatic cirrhosis; left renal infarct.

Discussion.

As a rule, either during life or at autopsy, a reason can be found for the presence of pathological change in the heart. However, there is a group of cases in which the heart at autopsy is found to be abnormal, but in which the ordinary causes of such changes are not present, examination of the coronary arteries, heart valves, pericardium and main blood vessels revealing no significant abnormalities. Brigden (1957) has recently described the features of many of these under the title of "non-coronary cardiomyopathies".

Among this group occur some in which the principal morphological changes seen in the heart consist of fibrosis of the endocardium and of the inner third of the myocardium. Endomural thrombosis may or may not be present. This lesion may be found as the sole abnormality in patients who die of congestive cardiac failure, or it may be found in association with evidence of other systemic disease, with or without heart failure. Watt and Lynch (1956) have described a case of periarteritis nodosa, in which these changes were found.

A number of suggestions have been put forward as to the ætiology of this fibrosis. The changes have been described in association with a variety of conditions—for example, eosinophilia (Hoffman, 1955), asthma and eosinophilia (Lennox, 1948; Lynch and Watt, 1957), the administration of arsenic (Edge, 1946), and malnutrition (Smith and Furth, 1943; Toreson, 1944). Brigden (1957) describes a case of heart failure following tonsillitis, in which at autopsy years later evidence of myocardial and endocardial fibrosis was found.

Changes in the endocardium and subendocardial regions of the heart may be found in other conditions. In scarlet fever these may be the portions most markedly involved, and Pearce (1954; cited by Davies and Ball, 1955) has described endocardial thickening in virus infection in rabbits.

Fibrosis of the endocardium may also be seen in association with syphilis (Norris, 1937).

Varying degrees of subendocardial necrosis and fibrosis may also be found in acute coronary insufficiency; this suggests that here it is ischæmic in origin (Master *et alii*, 1946; Horn *et alii*, 1950).

Therefore the exact mechanism by which the changes in the heart appear is uncertain. It is likely that they are the end result of a number of different pathological processes, as was suggested by Lynch and Watt (1957). Although widespread endocardial fibrosis with mural thrombosis will place a severe mechanical restriction on the heart, the endocardial changes may not be the prime cause of the heart failure. The main lesion may be in the myocardium, and the endocardial fibrosis may be secondary to this (Comeau, 1937).

Cases in which these changes have been found have been described from Africa (Bedford and Konstam, 1946; Davies and Ball, 1955), where they are apparently encountered frequently. These cases have some differences from those described elsewhere. In particular, in South Africa, Becker *et alii* (1953) were able to collect, in a fifteen-year period, 40 cases from 9500 autopsies, of which 32 were in Bantus and eight were in Europeans. They commented on the short course of some cases, and stated that while the average duration of symptoms was six months, some patients died less than one month after the onset of symptoms. In a detailed pathological study of the characteristic cardiac lesion, they described what they considered to be the successive steps in the evolution of the process. In the acute stage there were focal areas of mucinous œdema in the endocardium and perhaps enlargement of the overlying endothelial cells. Later, in these areas there could be fibrinoid necrosis and hæmorrhage. These polypoid areas, which were covered by swollen endothelial cells later in less acute cases, became organized and occupied by cellular granulomatous tissue. Later still, fibrosis and mural thrombosis occurred. In the acute cases, myocardial œdema and focal areas of myocardial degeneration were present, and in the developed lesion there was a tendency to subendocardial myocardial fibrosis.

Infantile fibro-elastosis has certain differences apart from the age incidence. In this, the endocardial thickening is smoother, and tends to involve the outflow tracts and hence the aortic valve, while the histological hall-mark is profound elastic reduplication.

In adults presenting with congestive cardiac failure, the clinical diagnosis of diffuse endomyocardial sclerosis is usually impossible. Certain clinical features, such as the absence of hypertension or evidence of ischæmic heart disease, may allow such a diagnosis to be suspected, especially if irregularities of rhythm, bundle branch block or embolic phenomena are also present. Such cases may be difficult to distinguish from constrictive pericarditis, and pericardotomy has been performed on occasions (McKusick and Cochran, 1952; Clark *et alii*, 1956). Even on cardiac catheterization, difficulty may be experienced in differentiating these two conditions.

The pathological features in this case were similar to those described in previous case reports.

Summary.

The clinical and pathological features of a case of diffuse endomyocardial sclerosis have been described. The patient was a woman, aged 54 years, who had had congestive cardiac failure for two years. At autopsy diffuse patchy fibrosis was found, involving the endocardium and the inner layers of the myocardium.

Acknowledgements.

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CARCINOMA OF THE ADRENAL CORTEX WITH FEMINIZATION.

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SINCE Bittorf's first report in 1919, only 37 cases of adrenocortical tumour with feminization have been described. Three recent publications (Higgins *et alii*, 1956; Guinet *et alii*, 1956; Wallach *et alii*, 1957) have reviewed the literature fully. Since these reviews a further case has been reported by Wolf *et alii* (1958). The characteristic clinical picture that has emerged can be summarized as follows.

The majority of patients have been in the third to fifth decade, and the development of gynæcomastia, which was often tender, occurred in all cases and frequently preceded other symptoms by months or even years. Loss of libido and impotence have also been common early symptoms, while pain at the site of the adrenal tumour has tended to occur later. Most patients have had a palpable abdominal tumour, and testicular atrophy has occurred in at least 50% of cases.

X-ray studies have demonstrated the tumour in most cases, as intravenous and retrograde pyelography seldom failed to show a characteristic depression of the renal calyceal system of the affected side; rarely has presacral air insufflation been necessary.

Urinary hormonal assays have also been very helpful. Where œstrogens have been assayed, there has usually been an increased amount, often as high as, or higher than, that found in late-pregnancy urine; the 17-ketosteroids have been increased in about 50% of the cases tested.

The great majority of tumours have been carcinomas with a tendency to metastasize to liver, lung and bone. Approximately 20% have been considered adenomas, though histologically it has been difficult to be sure the tumour was benign. The tumours have usually been encapsulated and varied in diameter from 2 to 15 cm. The microscopic appearance has been variable, though an adrenocortical origin was usually obvious. Recently a raised œstrogen content has been found in the primary tumour and the metastases.

Treatment has been by surgical removal of the tumour when operable. Radiotherapy has not been effective. The prognosis has been poor, the over-all mortality being approximately 80%, with a better prognosis in the benign tumours.

With adequate removal of the tumour, a regression of symptoms has occurred in most cases, gynæcomastia becoming less and libido and potency returning. A decreased urinary excretion of œstrogens has also been observed. In some cases there has been a return of symptoms with the occurrence of metastases.

Because of its rarity, it is our purpose to report a further case, with particular reference to urinary œstrogen assays.

Clinical Record.

The patient, aged 43 years, was referred to the Brisbane Hospital on January 23, 1958. He had been perfectly well until three months before his admission to hospital, when he developed anorexia, felt generally weak, and lost one stone in weight. Four weeks later his breasts became tender and enlarged, and there was a marked decrease in libido and potency; nocturnal erections and emissions ceased. A few weeks later his attention was drawn to a lump in the left side of his abdomen because of a dull pain in that region. His family history and previous medical history were not significant. He had four children aged 12 to 20 years.

On examination, he showed evidence of recent weight loss. There was marked gynæcomastia (Figure I) and

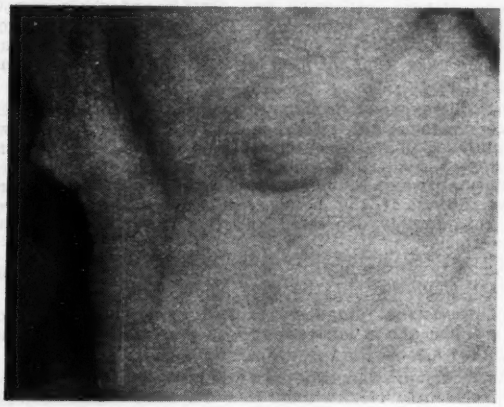

FIGURE I.
Photograph of the patient showing marked gynæcomastia.

his breasts were tender. There was neither increase in areolar pigmentation nor discharge from the nipples. On his left cheek there were two spider nævi, which he claimed had appeared only in the previous three months. A very large hard mass was palpable in the left side of his abdomen. It exhibited the clinical signs of a renal tumour. Both testes were soft and smaller than normal, the left more than the right. His penis appeared normal in size, though he considered it to be smaller.

Investigations were performed, which yielded the following information. The hæmoglobin value was 12 grammes per 100 ml.; the white cell count was 13,500 per cubic millimetre, with neutrophils 85%, lymphocytes 14% and eosinophils 1% of the total. A centrifuged deposit

of urine contained two leucocytes per high-power field. Attempts at urine culture produced no growth. The blood urea content was 20 mg. per 100 ml., and the blood sedimentation rate was 33 mm. in one hour. The serum sodium level was 147 mEq/l., serum potassium 4·8 mEq/l., serum chloride 100 mEq/l., and carbon dioxide combining power 29 mEq/l. The serum bilirubin content was 0·1 mg. per 100 ml. The cephalin-cholesterol flocculation test gave a negative result after 48 hours. The total serum protein content was 6·9 grammes per 100 ml., alpha globulin 0·35 gramme per 100 ml., alpha–2 globulin 0·8 gramme per 100 ml., beta globulin 0·92 gramme per 100 ml., and gamma globulin 1·1 grammes per 100 ml. An Aschheim-Zondek test gave a negative result.

The urinary output of corticosteroids, before and after an intravenous infusion of corticotrophin, was estimated by Dr. A. W. Steinbeck (Table I). The 24 hour collections of urine started at 9 a.m., and corticotrophin was given on the second day. The procedure was similar to that of Foggitt and Steinbeck (1958); 20 I.U. of corticotrophin were given at a constant rate over the first eight hours of the second day of urine collections. The steroid nomenclature is that of Norymberski and co-workers.

TABLE I.

Urinary Output of Corticosteroids (Milligrammes per 24 Hours).

Date.	17-keto-steroids.	17-ketogenic Steroids.	17-hydroxy Cortico-steroids.	Steroidal Dihydroxy-acetones.
February 13 to 14	27·7	7·8	15·9	1·9
February 14 to 15	38·4	15·9	27·3	8·0
February 15 to 16	28·2	8·3	16·3	3·1

The urinary œstrogens and acetaldehydogenic steroids were estimated (Table II). The method for œstrogens was that of Brown (1955). The method for triol and triolone was that of Cox and Finkelstein (1957) and Cox (1958).

An intravenous pyelogram showed a normal appearance on the right side, but on the left side there was diminished dye concentration and all calyces appeared depressed. A right retrograde pyelogram showed no abnormalities. A left retrograde pyelogram showed good filling of the pelvis and calyces, but they were all considerably depressed and the upper calyces rotated posteriorly.

An X-ray examination of the chest revealed enlarged breast shadows, but the lung fields were clear.

A provisional diagnosis of feminizing adrenal tumour was made, and a laparotomy was performed on February 17, 1958.

The tumour was exposed through a long incision over the eleventh rib, which was resected subperiosteally. Anteriorly, this incision was extended through the abdominal wall as far as the mid-line. The pleural sac was identified, mobilized by sharp dissection, and retracted without being opened. A very large tumour of the left suprarenal gland was then revealed, having descending colon stretched over it anteriorly, kidney densely adherent below, and some adhesion also to the spleen and diaphragm above. The peritoneal cavity was next opened and the abdomen explored. No metastases were palpated. After separation of the colon, spleen and diaphragm, the left renal pedicle and left ureter were isolated, ligated and divided. This step enabled the remainder of the blood supply to be secured without difficulty, the suprarenal tumour and kidney being removed in one piece.

The operation lasted two and one-quarter hours, and the patient's condition remained good throughout. His systolic blood pressure remained between 110 and 120 mm. of mercury.

Cortisone acetate, 200 mg. per day, was given orally for two days pre-operatively and 50 mg. of hydrocortisone intravenously during the operation. On the first post-operative day, 100 mg. of cortisone were given intramuscularly, and then cortisone was given orally in decreasing doses until it was finally ceased one week after the operation.

One month later radiotherapy was administered to the former site of the tumour over a period of three weeks. With the use of supervoltage X-ray equipment, the total dose was 4000 rads.

Pathological examination of the specimen was made by Dr. Margaret Mead. It was a rounded encapsulated tumour measuring 15 cm. by 12 cm. by 12 cm. and attached to the concavity of the kidney throughout its length (Figure II). The cut surface was yellowish-white with blackish areas scattered throughout. The tumour tissue was soft and tended to be necrotic in places. Fibrous septa divided it into three sub-compartments.

Microscopically (Figure III)[1], the tumour was composed of sheets of large polyhedral cells with vesicular nuclei and either clear, vacuolated or eosinophilic cytoplasm. There were large areas of necrosis, much nuclear pleomorphism and a number of multinucleated tumour giant cells. Mitoses were present in moderate numbers. The tumour had numerous very thin-walled blood vessels, some of which contained clumps of tumour cells. There was a distinct capsule of fibrous tissue and several vessels in this contained clumps of tumour cells.

Post-operative urinary assays for œstrogens and acetaldehydogenic steroids were performed (Table II).

Although the patient's immediate post-operative progress was rather slow, he did notice a complete disappearance of breast tenderness within a week. Breast size decreased more gradually, but did not return to normal. After about one month he began gaining weight and energy and felt very well. Within three months he thought his penis had increased in size and there was a return of nocturnal erections and emissions. Libido and potency were hard to assess, as he had recently had a legal separation from his wife. Objectively, there was no obvious change in his genitalia or in the spider nævi on his cheek.

In July, 1958, he noticed his abdomen was swelling and there was generalized abdominal pain. He was readmitted to hospital on August 24. His liver was enlarged below the level of the umbilicus and extremely hard. There had been no recent change in his breasts and his genitalia and spider nævi were unchanged. As a recurrence of his malignant disease had obviously taken place, further urinary assays for œstrogens were performed (Table II). A small amount of heavily blood-stained ascitic fluid was removed, which microscopically showed the presence of malignant cells. He became grossly œdematous below the level of his umbilicus, and this progressed with much abdominal pain until he died on October 22.

At autopsy the microscopic findings chiefly concerned the liver, which was grossly enlarged and weighed 236 oz. The enlargement mainly involved the right lobe where there were numerous tumour deposits up to 11 cm. in diameter. Many of these had soft necrotic centres and some had burst through the liver capsule. There were only a few small tumour deposits in the left lobe. The secondary deposits resembled histologically the original lesion, although the nuclei were less pleomorphic and the cytoplasm was more eosinophilic.

The peritoneal cavity contained one litre of reddish-brown fluid, and there was marked fibrosis at the former site of the tumour. The inferior vena cava did not contain tumour tissue to explain the terminal œdema.

Scattered throughout both lungs were a few rounded circumscribed areas up to 3 cm. in diameter. Many of these had necrotic centres. Microscopically, these were areas of bronchopneumonia, but secondary deposits were found in a lymph gland taken from the hilum of the liver.

[1] See art-paper supplement.

TABLE II.
Urinary Œstrogens and Acetaldehydogenic Steroids.

Date of Collection.	Œstrogens. (Milligrammes per 24 Hours.)				Acetaldehydogenic Steroids. (Milligrammes per 24 Hours.)		
	Œstriol.	Œstradiol.	Œstrone.	Average Total.	Triol.	Triolone.	Total Acetaldehydogenic Substances.
Pre-operative:							
February 10, 1958 ..	0·77 0·73	0·11 0·10	0·53 0·53	1·39	2·4	0·0[1]	5·0
February 16, 1958 ..	0·62 0·60	0·063 0·058	0·56 0·50	1·20	5·3	0·0[1]	8·8
Post-operative:							
March 7, 1958	0·011 0·007	0·011 0·010	0·007 0·008	0·03	1·2	0·0[1]	5·1
In presence of metastases:							
September 1, 1958 ..	0·19 0·24	0·08 0·09	0·26 0·18	0·52			
September 4, 1958 ..	0·32 0·30	0·11 0·13	0·35 0·54	0·89			

[1] Amounts below 0·05 mg. per 24 hours not detectable.

Each testis measured about 2 cm. in its longest dimension. Histologically, the seminiferous tubules were in a quiescent phase with no spermatogenesis apparent.

No histological study was made of the breasts.

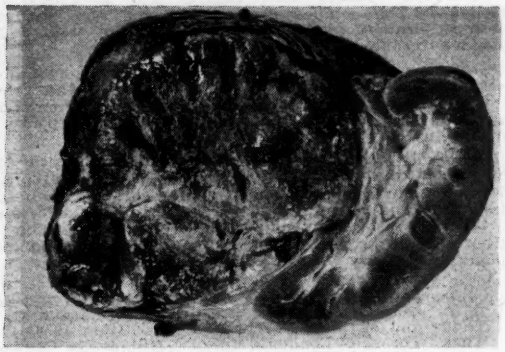

FIGURE II.
Cut section of the kidney and tumour.

Discussion.

This patient presented the usual clinical features found in a case of adrenal carcinoma with feminization. Spider nævi have not been reported previously and were possibly related to increased œstrogen production. However, they did not change post-operatively when urinary œstrogen levels fell to normal.

The urinary œstrogen levels in this case are of much interest. Excessively high œstrogen excretion was noted in the pre-operative samples, returning to near normal levels post-operatively. The pre-operative œstrogen levels were of the order of a hundred-fold normal values and are amongst the highest reported for such a case. With metastases the œstrogen level rose again to near pre-operative levels, although an increase in gynæcomastia did not occur. Measuring "phenolic steroids", Guinet *et alii* (1956) reported a decrease post-operatively, which was later followed by some rise in level with onset of metastases. However, in this case the "phenolic steroid" level was not grossly elevated. In two previous reports (Simpson and Joll, 1938; Staubitz *et alii*, 1954) with the use of bioassay methods, high œstrogen levels were found post-operatively in the presence of metastases, but no pre-operative studies were performed.

From the present case, a comparison of the pre-operative and post-operative levels is possible, and the chemical fractionation used shows that the relative proportions of œstrogen found as œstriol, œstrone and œstradiol are approximately similar. The ratios of the levels of these three œstrogens is of interest. In other studies in which œstrogens have been separated into œstriol, œstradiol and œstrone fractions, Landau *et alii* (1954) found similar ratios to those reported here, which resemble normal ratios. However, Diczfalusy and Luft (1952) found œstriol at a much higher level relative to the other œstrogens, and Mason and Kepler (1945) found œstrone as the major œstrogen in one case. Such wide differences in the urinary excretion pattern of œstrogens in these cases may be due to different abnormalities in anabolism or catabolism of œstrogens.

Salhanick and Berliner (1957) isolated a compound identified as equilenin from the tumour tissue of a patient with adrenal carcinoma associated with gynæcomastia. The presence in the tumour of this œstrogen, previously found only in equines, would suggest that it may be found in urine in these cases. The method of estimation used in this study does not separate equilenin from œstrone. On the other hand, these two œstrogens give different colours in the test used, and the œstrone levels noted were largely corrected for the possible presence of any equilenin. Some chromatographic evidence suggested that equilenin was, in fact, present in the urine of this patient, as will be reported in detail elsewhere (Cox, to be published).

The urine of patients with adrenocortical carcinoma and gynæcomastia has been found to contain above-normal levels of pregnane-3, 20-diol (Higgins *et alii*, 1956; Wallach *et alii*, 1957; Wolf *et alii*, 1958). The expected precursor of this steroid is progesterone, which is also converted to 17-hydroxyprogesterone and thence in part to pregnane-3, 17, 20-triol. The levels of the latter steroid and the corresponding 11-ketone were estimated, since the excretion of these compounds is of interest in relation to adrenal dysfunction (Cox and Finkelstein, 1957). Pregnanetriol levels pre-operatively were somewhat elevated, but the post-operative level was within the normal adult range; no detectable amount of pregnanetriolone was found. This pattern is similar to that which has been observed for patients with some adrenal tumours other than those producing gynæcomastia (Cox and Finkelstein, 1957; Finkelstein and Shoenberger, 1959).

The urinary excretion of 17-ketosteroids was at the upper limits of normal; the difference between the 17-hydroxycorticosteroids and 17-ketogenic steroids was greater than the normal difference, which seldom exceeds 3 mg. per 24 hours. The alteration in the steroid excretion after corticotrophin essentially followed a normal pattern, although the output of 17-ketogenic steroids did not attain normal levels. It has to be assumed that the presence of certain steroids in the

urine interfered with the chemical determination of the 17-ketogenic steroids or, in effect, that the chemical procedures over-estimated 17-hydroxycorticosteroids at the expense of 17-ketogenic steroids. The corticosteroid excretion shows that the hypersecretion of œstrogens was essentially an isolated excess.

Summary.

1. The clinical features of carcinoma of the adrenal cortex with feminization are described.

2. A case is reported in which the patient showed the characteristic triad, that it, gynæcomastia, loss of libido and a palpable tumour in the region of a kidney.

3. Urinary œstrogen levels were extremely high.

4. Resection of the tumour produced a regression of symptoms and a return to normal of the œstrogen excretion.

5. With the appearance of metastases there was a return of the high œstrogen excretion without an increase in the gynæcomastia.

Acknowledgements.

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Reviews.

Anatomy of the Human Body. By R. D. Lockhart, M.D., Ch.M., F.R.S.E., G. F. Hamilton, B.Sc., M.B., Ch.B., and F. W. Fyfe, M.A., M.B., Ch.B.; 1959. London: Faber and Faber, Limited. 9¾" x 7", pp. 708, with 965 illustrations. Price: £5 5s. (English).

IT is always a pleasure to read a new textbook of anatomy, and on occasions the experience can be quite exciting. This is such an occasion. Robert Lockhart, the Regius Professor of Anatomy at Aberdeen, has always stressed the living and functional approach to the teaching of anatomy. This was well shown in the magnificent photographs in his "Living Anatomy", first published in 1948 and now in its fourth edition. It is also most emphatically brought out in the book under review.

Lockhart, Hamilton and Fyfe have produced a most stimulating book on anatomy for students of all ages, in which the most ingenious means have been devised of correlating text and illustrations by the use of pointers. We can appreciate the enormous amount of very detailed labour that has gone into its production. The result is well worth the effort.

The text has been condensed, so that due emphasis can be given to the illustrations which form the outstanding feature of this book. All of these have been specially prepared. They are clear and dogmatic and will be of the greatest assistance to both student and post-graduate in enabling them to correlate the anatomy of the dead subject with the function of the living. The sections on the nervous system, both central and peripheral, are excellent. The detailed drawings of the fibre pathways are most dramatic, and provide the student with a new approach to the clarification of their anatomy.

The bones are logically discussed with the joints, and it is pleasant to see radiological evidence of the growth of the skeleton. Many of the photographs from Lockhart's "Living Anatomy" are used to illustrate points on surface anatomy.

The highly critical reviewer may find fault with some aspects of this book, may even accuse the authors of unevenness in the layout of the text; but this book is so stimulating and unconventional that any minor defects can be ignored. It is an outstanding work on which the authors are to be congratulated. It will be referred to by students for many years to come.

Principles of Internal Medicine. Edited by T. R. Harrison, R. D. Adams, I. L. Vennett, Jr., W. H. Resnik, G. W. Thorn and M. M. Wintrobe; Third Edition; 1958. New York, Toronto, London: McGraw-Hill Book Company, Incorporated. 9¾" x 7", pp. 1844, with many illustrations. Price not stated.

THE third edition of Harrison's well-known text-book of medicine has been produced, the first edition having appeared in 1950. Professor Harrison, the chief editor, is assisted by five associate editors, and the complete text-book is written by 98 contributors in all. Looking over the list of contributors, we are impressed by the excellent qualifications of those who have written this book. With a text-book written by so many, it is to be expected that there would be certain conflicting variations of opinion in different chapters. This is inevitable; but when comparison is made with other text-books written by multiple authors, this disadvantage has been very well overcome by the chief editor and his associates.

Considerable sections of the book have been rewritten and new sections included. These have brought the book completely up to date as far as a text-book of this kind can be up to date, and the editors are to be congratulated on producing a book which can be used as a text-book for students and a modern reference book for practising physicians.

The arrangement of the book is unusual, in that it aims at correlating the knowledge that a student gains in basic sciences, such as physiology and biochemistry, with clinical medicine. Other text-books of medicine have attempted to use this rather difficult method, and in our opinion have failed to some extent. This text-book seems to achieve this purpose rather well, and does place medicine on an essentially scientific basis.

The first part deals with "Cardinal Manifestations of Disease". In this part, the main symptoms and signs that one meets in patients are related to the diseases that cause them. When this part is first approached, it appears to be a rather jumbled collection of clinical manifestations. However, when taken in conjunction with the rest of the book,

it proves most helpful to the reader, even to the reader with considerable experience. The third part deals with biological considerations such as inheritance, neoplastic disorders, fluid and electrolyte balance, etc. The next section deals with nutritional deficiencies, all the hormone disturbances, metabolic diseases of bone, and errors of metabolism. Part V discusses the disorders due to chemical and physical agents, and Part VI the diseases due to infection with bacteria and other microorganisms. Part VIII considers diseases of organ systems, taking eight main systems, and describes the diseases which occur in these systems, but with considerable reference to the previous parts which relate to aetiological factors. This part, which takes up about one-third of the total text of the book, also fills in all those parts of medicine which have not been covered under the previous headings. Finally there are short sections on the care of the patient, some special problems such as blood transfusions, the treatment of shock and iatrogenic disorders. These sections are followed by an appendix giving laboratory values of clinical importance.

The index, which covers 57 pages, is extremely detailed, and makes cross reference within the book very easy. The whole arrangement of the book into parts, sections and chapters, practically all of which have a further list of references to medical literature, in addition to the excellent index, makes this book very easy to use for both general reading on a subject and for ready reference.

With many text-books on medicine of this size, especially those by multiple authors, we tend to be rather critical of the finished product, because it is often a collection of short treatises by individual contributors on their favourite subjects. The student then often finds it difficult to get a coordinated account of medicine as a whole. This text-book of medicine impresses us more than most large text-books with multiple authors for the reason that it does make a composite whole, and the student is able to use this book to apply his knowledge of basic sciences to the understanding of clinical medicine.

We can enthusiastically recommend this text-book to undergraduates, doctors in general practice and specialist physicians alike.

A Synopsis of Obstetrics and Gynæcology. By A. W. Bourne, M.A., M.B., B.Ch. (Cambridge), F.R.C.S. (England), F.R.C.O.G.; Twelfth Edition; 1959. Bristol: John Wright & Sons Ltd. 7¼" x 5¼". Price: £1 15s.

THIS is a remarkably complete manual for undergraduates, and serves well as a "swot book" for examinations. The strictly synoptic nature of the text, written in note form under headings and subheadings, with lists wherever possible, is justified by the author in a preface on the grounds that it is intended to be read only after the standard text-books on the subject have been studied and patients examined—in other words, it provides a systematic approach to revision, presenting information in a suitable form for the examinee.

Now in its twelfth edition, the book contains many additions of new work and corresponding deletions of stale matter, with some completely new results mentioned together with the names of the researchers. While, therefore, it may be considered quite up to date, several archaic procedures such as cleidotomy are retained in detail, since the author believes that the necessity may still arise for these where the *accoucheur* finds himself working in isolated and primitive conditions.

The book is workmanlike in presentation, adequately bound and not too cumbersome. The print is small but readable, and the necessary diagrams are, while small, still clear and uncluttered. There is a good deal of recapitulation, as each chapter is complete in itself and an enormous volume of information is provided. If any criticism could be made, it would be perhaps that the detail is in excess of undergraduate needs; but we have found that undergraduates themselves soon correct any errors made in that direction.

Postural Drainage and Respiratory Control. By E. Winifred Thacker, M.C.S.P.; Second Edition; 1959. London: Lloyd-Luke (Medical Books) Limited. 7¼" x 4¼", pp. 72, with 37 illustrations. Price: 10s. 6d. (English).

EFFECTIVE PHYSIOTHERAPY is undoubtedly one of the major advances in the modern treatment of chest diseases, and it is surprising that so little has been written on the subject. Here is a welcome little book for the physiotherapist treating chest diseases, written so simply and engagingly that it can be read with understanding by a lay person supervising home treatment or by the patient himself. Written by the superintendent physiotherapist of a large English hospital, it is essentially a practical manual whose author shows a fine appreciation of the many pitfalls in the carrying out of procedures, and is charming simplicity itself in her suggestions as to how these may be overcome.

The most valuable parts of the book are the photographic series illustrating the positions for postural drainage, each photograph accompanied by a diagram of the position of the bronchus being drained, and the similar series dealing with posturing of post-operative patients. Special mention is made of pneumonectomy and thoracoplasty management. There is a section advising on the special problem of the young child, and this second edition adds a chapter on postural drainage in the home. In the first edition the title was simply "Postural Drainage"; but the scope of the book has widened to cover a large range of chest management. Breathing exercises and correct coughing are discussed at some length.

Beginning with some remarks on the physiology of respiration and the rationale of drainage and exercise, the author has, nevertheless, avoided the use of too many technical terms, and has kept her discussion simple and pertinent. She stresses that if the patient is to give his full cooperation he must be both relaxed and comfortable, and her intensely practical approach should enable the patient-therapist team together to achieve this ideal.

Physiology of Spinal Anesthesia. By Nicholas M. Greene, B.S., M.A., M.D., with a foreword by John Gillies, C.V.O., M.C., F.R.C.P.E.; 1958. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 5¾", pp. 208, with illustrations. Price: 66s.

THIS book on physiology as affected or altered by spinal anæsthesia is very well conceived.

Beginning with a foreword by John Gillies, of Edinburgh, it considers in turn the effect of spinal anæsthesia on each of the major systems of the body. The cardio-vascular system receives the lion's share, of about 70 pages, and in this, as in the rest of the book, each point is considered in the greatest detail, with extensive references to original authorities. This is a mixed blessing in a way, as it leads to a formless and discursive text, with few headings or arresting tabulations, in which the reader skips rather painfully from pinnacle to pinnacle of knowledge, over numerous bracketed lacunæ of proper names and dates.

Apart from this minor and probably necessary limitation, the book is as full of information as a book can be, and the reference list at the end of each chapter almost amounts to a bibliography of the subject.

The remaining chapters, on the effects of spinal anæsthesia on the liver, on renal function, on the endocrines, on metabolism and in pregnancy, are equally well written, and the book is confidently recommended as a source of material to teachers and lecturers and for consultation on specific points by the post-graduate student.

Nurse-Patient Relationships in Psychiatry. By Helena Willis Render, R.N., B.S., and M. Olga Weiss, R.N., M.Litt.; Second Edition; 1959. New York, Toronto and London: McGraw-Hill Book Company, Incorporated. 8½" x 5½", pp. 330. Price: $5.95.

THE balance of the second edition of this book on nurse-patient relationship in psychiatry, ten years after the first, brings it up to date on treatment, and it includes a completely new chapter on rehabilitation. It stresses that psychiatric nursing is actually a further development and refinement of certain aspects of general nursing. Psychiatric nursing and general nursing do not compete, but should combine.

At all times the patient must be regarded as a person. As the authors state:

> We must obtain a mental dossier of the patient, his outstanding life experiences and his way of living.

Hence, there is no classification of the various mental illnesses. The function of the nurse is not to diagnose, but to understand that every symptom shown by the patient is indicative of a problem. The reputation of a hospital depends on the first contacts, which are generally with the nurse. The time spent with the patient helps both the nurse and the psychiatrist. The nurse is taught to observe, record and understand, and how to modify behaviour. The patient's rights and the respect due to him as a person are stressed.

The chapter on special problems, ranging from accident or suicide to the handling of relatives, is especially valuable and full of worthwhile hints and suggestions.

In the chapter on rehabilitation, the function of each member of the team is listed, and the necessity for complete teamwork is stressed. The immense industrial potential of occupational therapy in a large mental hospital is detailed, as well as the indirect therapeutic value of ward activities. As the nurse works in the different wards of the hospital, so the expenditure of her mental and physical energies varies from ward to ward.

The chapter on secondary personality changes stresses that in such changes there is always a primary physical diagnosis. In these conditions the nurse must know how she can cooperate in attacking the physical symptoms, while realizing that the basic personality pattern influences are the reaction of any individual to disease.

Each chapter is followed by a bibliography, which, unfortunately, refers to American journals only, which are not readily available here. Review questions at the end of each chapter stimulate the student to further thought and discussion. An appendix gives an outline for the study of Flaubert's "Madame Bovary" as material for the understanding of the patient. While neither Emma nor Charles Bovary was insane, they were both mentally unhappy adults.

Methods of Biochemical Analysis. Edited by David Glick; Volume 6; 1958. New York and London: Interscience Publishers, Inc. 9" x 5¾", pp. 368, with many illustrations. Price: $8.50.

Methods of Biochemical Analysis. Edited by David Glick; Volume 7; 1959. New York and London: Interscience Publishers, Inc. 9" x 6", pp. 362 with illustrations. Price: $9.50.

THE demands for greater precision and accuracy in analysis can no longer be met reliably by text-books and manuals in most biochemical fields. Whether the analyses are for research studies, industrial control, forensic medicine or clinical diagnosis, the analyst frequently has first to undertake a detailed study of a series of techniques for estimating a number of related compounds. He is most fortunate if his particular problem has received attention in this best standard work on fine biochemical analysis. The appearance of the sixth and seventh volumes provides a continuing series of authoritative studies now totalling 75.

These two volumes contain chapters on the following subjects: new developments in the chemical determination of nucleic acids; the microbiological assay of nucleic acids and their derivatives; the determination of formaldehyde and serine in biological systems; new methods for purification and separation of purines; assay of serotonin and related metabolites, enzymes and drugs; determination of transaminase; glycolipide determination; methods for the determination of thiamine; rapid electrophoresis in density gradients combined with pH and/or conductivity gradients; determination of hexosamines; immuno-electrophoretic analysis; the analysis of basic nitrogenous compounds of toxicological importance; spectrophotometry of translucent biological materials—opal glass transmission method; the determination of inositol ethanolamine and serine in lipids; assay of lipoprotein lipase *in vivo* and *in vitro*; determination of creatinine and related guanidinium compounds; determination of ethyl alcohol in blood and tissues; determination of heparin.

In all these chapters there are set out in detail methods, criticisms of methods, reference data physical and chemical, bibliography and often commercial information on materials and equipment. Cumulative indices of authors and titles, as well as volume indices and a table of contents at the head of each chapter, make this series very efficient for a rapid search of data. It continues to be an indispensable laboratory guide.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Diagnosis of Congenital Heart Disease: A Clinical and Technical Study by the Cardiologic Team of the Pediatric Clinic, Karolinska Sjukhuset, Stockholm", by Sven R. Kjellberg, Edgar Mannheimer, Ulf Rudhe and Bengt Jonsson; second edition; 1959. Chicago: The Year Book Publishers, Incorporated. Sydney: W. Ramsay (Surgical) Limited. 10" x 6¾", pp. 866, with 727 illustrations. Price: £15 8s.

"Kilocurie Cobalt 60 Therapy at the Radiumhemmet: Equipment, Technique and Dose Measurements", by S. Hultberg, O. Dahl, R. Thoraeus, K. J. Vikterlöf and R. Walstam; Acta Radiologica Supplement No. 179; 1959. 9¾" x 7", with 63 illustrations, 13 tables and 135 charts. Price: Sw. Kr. 35.

"Lectures on the Interpretation of Pain in Orthopedic Practice", by Arthur Steindler, M.D., (hon.) F.R.C.S. (Eng.), (hon.) F.R.S.M. (Eng.), F.A.C.S., (hon.) F.I.C.S., with anatomical dissections by Dr. Rodolfo Cosentino; 1959. Springfield, Illinois: Charles C. Thomas, Publisher. Oxford: Blackwell Scientific Publications, Limited. 10" x 6¾", pp. 752, with many illustrations. Price: £7 8s. (English).

"A Textbook of Human Embryology", by R. G. Harrison, M.A., D.M.; 1959. Oxford: Blackwell Scientific Publications. 9¾" x 7½", pp. 256, with 144 illustrations. Price: 45s. (English).

"Peripheral Facial Palsy: Pathology and Surgery", by Karsten Kettel M.D. with a foreword by Terence Cawthorne, F.R.C.S.; 1959. Oxford: Blackwell Scientific Publications. 10" x 6¾", with 127 illustrations. Price: £6 (English).

"The Roentgenographic Slit Methods: A Survey and Analysis of Procedures Based on the Use of a Narrow Bundle of Roentgen Rays (Scanography)", by Pekka Vuorinen. Acta Radiologica Supplement No. 177; 1959. 9¾" x 7", pp. 88, with 42 illustrations and 5 tables. Price: Sw. Kr. 25.

"Poliomyelitis: Papers and Discussions Presented at the Fourth International Poliomyelitis Conference", compiled and edited for the International Poliomyelitis Congress; 1959. Philadelphia and Montreal: J. B. Lippincott Company. Sydney: Angus & Robertson, Limited. 10" x 7", pp. 704, with 422 illustrations. Price: 82s. 6d.

"Determination of Cell Mass by Direct X-ray Absorption", by Bengt H. O. Rosengren. Acta Radiologica Supplement No. 178; 1959. 9½" x 7", pp. 62, with 24 illustrations and 4 tables. Price: Sw. Kr. 25.

"Behavioral Change in the Clinic—A Systematic Approach", by Gerald R. Pascal, Ph.D.; 1959. New York and London: Grune & Stratton, Incorporated. 8¾" x 5", pp. 136, with illustrations. Price: $4.75.

"Immunological and Hæmatological Surveys: Report of a Study Group", World Health Organization Technical Report Series No. 181; 1959. Geneva: World Health Organization. 9¾" x 6¾", pp. 35. Price: 1s. 9d.

"Individualtherapie und Prophylaxe der hysterischen, anankastischen und sensohypochondrischen Neurosen", by Karl Leonhard; 1959. Jena: Veb Gustav Fischer Verlag. Sydney: Angus & Robertson, Limited. 8¾" x 6", pp. 80. Price: DM. 6.35.

"Aphasie-Therapie", by Miklós Vargha and György Gerébe; 1959. Jena: Veb Gustav Fischer Verlag Sydney: Angus & Robertson, Limited. 8¾" x 5", pp. 46. Price: DM 6.85.

"Effect of Small Doses of Alcohol on a Skill Resembling Driving", by G. C. Drew, M.A., W. P. Colquhoun, M.A., Ph.D. and Hazel A. Long, B.Sc.; Privy Council, Medical Research Council Memorandum, No. 38; 1959. London: Her Majesty's Stationery Office. 9¾" x 6", pp. 114, with many tables. Price: 7s. 6d. (English).

"Synthesis and Organisation in the Bacterial Cell", by E. F. Gale; 1959. New York: John Wiley & Sons, Incorporated. 7" x 4¾", pp. 118, with 14 illustrations. Price: $3.50.

"New Biology, No. 30", edited by M. L. Johnson, Michael Abercrombie and G. E. Fogg; 1959. Mitcham, Victoria: Penguin Books, Incorporated. 7" x 4", pp. 128, with many illustrations. Price: 4s.

"A Biochemical Approach to Pathology", by M. J. R. Dawkins, M.B., B.Ch., M.R.C.P. and K. R. Rees, M.Sc., Ph.D.; 1959. London: Edward Arnold (Publishers) Limited 8¾" x 5¼", pp 138, with 30 illustrations. Price: 33s. 6d. (Aust.).

"At Your Best For Birth (and Afterwards)", by Eileen Montgomery, M.C.S.P., with a foreword by H. L. Shepherd, Ch.M., F.R.C.O.G.; 1959. Bristol: John Wright & Sons, Limited. 8¾" x 5¾", pp. 59, with 30 illustrations. Price: 5s. 6d. (English).

"Institutional Neurosis", by Russell Barton, M.B., M.R.C.P., with a foreword by Noel Gordon Harris, M.D., F.R.C.P., D.P.M.; 1959. Bristol: John Wright & Sons, Limited. 8¾" x 5¼", pp. 57, with illustrations. Price: 8s. 6d. (English).

"Emergencies in Medical Practice", edited by C. Allan Birch, M.D., F.R.C.P.; Sixth edition; 1960. Edinburgh and London: E. & S. Livingstone, Limited. 8¾" x 5¼", pp. 464, with 133 illustrations. Price: 45s. (English).

The Medical Journal of Australia

SATURDAY, FEBRUARY, 27, 1960.

LEAF PROTEIN.

EVER since the publication of Malthus's "Essay on Population" in 1798 there have been those who looked with apprehension on the steadily increasing numbers of the human race in relation to its food supply. The economic expansion of resources during the nineteenth century for a time seemed to most to give the lie to these fears, and even 25 years ago it was intellectually fashionable to regard Malthus as a bogy-man, and to look for an easy solution to the problem of numbers and resources to the tendency for the birth-rate to fall with increasing prosperity. Since then, in spite of disastrous wars, the accelerating rate of the increase of mankind has caused more and more people to take serious stock of this phenomenon, certain aspects of which we discussed in the issue of January 30, 1960. The considerable publicity which world population problems have received in the past year or so is but the reflection of the growing concern with which these have been viewed by many individuals in responsible positions for a number of years. One aspect of this concern is the amount of thought which has been put into the basic problem of ways and means of increasing the available food supply, with emphasis on the word availability. This was referred to only in passing in our previous discussion and can with profit be considered further.

It is agreed that very large numbers of the world's population do not get enough protein in their diet. Among more prosperous peoples the traditional sources of protein for human consumption have been mainly animal, but it has frequently been pointed out that, in terms of the quantity of food produced, the production of animal protein is a relatively inefficient use of land as compared with the growing of vegetable crops. In countries where the pressure of population on the land is heavy, production of animal protein in large quantities is simply not practicable, even where religious prejudice does not interfere. However, wherever there is enough fresh water there is an abundance of leaves, and for some years the problem of making this abundant plant protein available for human consumption on the spot has been under investigation at the famous Rothamsted Experimental Station in England. A recent article by N. W. Pirie,[1] who has been closely concerned with this work, indicates that it has now reached a definite stage. The objective has been to develop a method whereby leaf protein in an edible form can be extracted cheaply, at the place where it is required, from whatever source is locally available. Three main sources are envisaged: first, use might be made of the waste leaves from recognized crops—for example, sugar-beet tops and pea haulms in temperate climates; secondly, once the method was established and the product accepted, it would probably be found profitable to grow leafy crops primarily for the purpose of producing leaf protein; thirdly, it might be possible to use wild leaves, though, except in a few special cases, the problem of collection would probably make this source unimportant.

The method of extraction suggested by Pirie consists essentially of first pulping the leaves, then separating the juice; the protein in the juice is next coagulated by heat, and finally purified by repeated washing and filtration. He states that the final product is a dark green cake, having the consistency of cheese or yeast, and little or no taste or smell. As for its efficiency as a food, this product is in fact a mixture of a great number of different proteins, and, while it is not equivalent to the preeminent proteins such as casein and egg albumin, there seems no reason to doubt its biological efficiency. Pirie considers that two points can now be reasonably regarded as established—namely, that leaf protein can be made on a technological scale, and that it is a useful food. He adds that two further points need intensive study. One is the type of leaf which could be used in those countries where the need is most acute; this is obviously a question which must be studied separately in relation to the local circumstances in each case in which the method is to be applied. The other, and very crucial, question is how the protein is to be fitted into the diets eaten in those countries where its use is desirable, and Pirie has made an open offer to send refrigerated samples of up to 50 kg. to anyone who wishes to undertake a serious study of its acceptibility and nutritive value in man, especially in a region which is now undernourished.

The idea of short-circuiting the course of nature and using leaves as a direct source of protein for human consumption has occurred to many people, and in fact may be said to be as old as Nebuchadnezzar, but according to Pirie no attempt at large scale separation of the protein as a purified product was made until 1940. Those to whom the idea is a novelty will be inclined to to look on it, at first sight, as somewhat remote from reality. However, it appears to have been attracting increasing interest in the last few years. In *The Times* of September 11, 1959, there is a report of "a new process for extracting edible protein . . . from vegetable matter" developed by a British company who estimated the cost of production of the protein at their pilot plant in London to be 1s. 6d. per pound, and thought that this figure could be materially reduced with larger scale production. Pirie mentions that several commercial units for making leaf protein have been advertised and welcomes this development, but warns that some of the processes proposed may not be very practicable. A report submitted to the Committee on Foreign Relations of the United States Senate, quoted in a leading article in *The Lancet*,[2] in discussing the importance of new sources of protein refers to Pirie's work with the comment that "unless a social mechanism can be created to introduce

[1] *Lancet*, 1959, 2: 961 (November 28).

[2] *Lancet*, 1959, 2: 956 (November 28).

the machinery where it is needed, it will remain where it is—a curiosity to Britons, an unknown potential to areas where it could be tried, tested and adapted". In the same leader *The Lancet* points out that kwashiorkor, basically caused by lack of suitable dietary protein, is the most widespread and important deficiency disease in the world today, and suggests that leaf protein may become a major weapon in the battle against this disease.

Since the publication of Pirie's article, several correspondents have written to *The Lancet* somewhat critically of the ideas put forward, in particular tending to query the biological efficiency of leaf protein as compared with powdered milk, which is at present being distributed in some areas (notably Uganda) where signs of protein deficiency are prevalent. It seems evident that concentrated leaf protein is potentially a valuable product, but it is also evident that a number of important questions remain to be decided, and it will be interesting to see whether the apparent drawbacks of this product will outweigh its possible value in the economy of densely populated countries. Certainly the question is an important one, and whether or not concentrated leaf protein ever comes to make an important contribution to national diets, Pirie is performing a useful service in exploring the possibilities of this potentially major source of nutriment.

Current Comment.

CONTRIBUTIONS OF THE SCIENCES IN HUMAN DISABILITY.

REHABILITATION has rightly grown in scope and possibilities in recent years and has drawn into its service the resources of many different disciplines, trades and services. A recent publication from the New York Academy of Sciences[1] is particularly notable because it brings out this very point and indicates in particular the scope of the ancillary services which can give a direct or indirect contribution. The background research recommended raises points of considerable value to those concerned with both the physical and the psychological aspects of rehabilitation. At the same time there are views expressed with which everyone will not necessarily agree.

In the first paper, H. A. Mauch discusses the application of engineering technology to the simulation of human motion. His formulæ and calculations are formidable, but his hydraulic swing control system appears, on paper, to be a useful device. However, it would add considerably to both the cost and the weight of a prosthesis, and there is reasonable doubt that it would be really necessary for the great majority of prostheses; the problems it solves can be solved almost as well with much simpler, lighter and less expensive devices.

W. B. Haber's studies on the physiological and psychological aspects of reactions to the loss of an arm are concerned, first, with the evaluation of tactile sensation and discrimination, and it is concluded that the distal portion of the stump takes over some of the sensory functions of the hand. Considering that most people who lose one arm find the stump of more value for many purposes than a prosthesis, this is not an unexpected finding. Haber's survey of phantom-limb phenomena covers no new ground, and offers no help beyond a suggestion that the central theory of the causation of these phenomena is the most likely. His psychological tests indicate, as might be expected, that there is a refusal to relinquish body-image integration and a concentration on anatomical responses.

S. A. Weiss deals with the body image as related to phantom sensation. He emphasizes the psychological basis for phantom phenomena, and produces arguments in favour of immediate fitting of prostheses (and of complicated prostheses with elaborate functions at that) as a factor of value in reducing phantom phenomena. This is not quite the view of B. D. Litt, who comments on the biological aspects of amputation in the matter of neurological dysfunction. He points out that the non-amputated person has developed strong patterns of function that involve specific series of synaptic junctions, and that while amputation removes the possibility of utilizing these, the central and non-affected peripheral synaptic junctions remain intact regardless of the level of cerebral acceptance; at the same time, the amputee must learn new patterns of body function at both conscious and subconscious levels. While immediate fitting of a prosthesis may be psychologically desirable, a minimum of three months is usually needed for healing, stump adaptation and reduction of sensitivity; in this interval new behaviour-patterns will be developed, and then there must again be a modification of these for accommodation to a prosthesis. Finally, there must later be developed a further series of synaptic junctions as full utilization of the prosthesis increases the wearer's skill. Recognition of these stages is important; the superimposing of the various series of new synaptic junctions, requiring at least the subordination of the older ones, may be largely responsible for some of the phantom phenomena.

Several papers emphasize the need for cooperation with engineers, psychologists, sociologists, physiologists and many other specialists in order to secure full rehabilitation of amputees. Undoubtedly much research on lines outside the normal scope of medical training is needed to solve basic problems; but the impression gained from these papers seems to invite the conclusion that final rehabilitation must be carried out by a limited team consisting of physiotherapist, occupational therapist, artisan and social worker, headed by a medical officer with considerable mechanical ingenuity and a sympathetic grasp of applied psychology of the general-practitioner type.

The need for, and desirable scope of, outside lines of research are indicated by the equipment and methods described by M. Marks and G. G. Hirschberg in analysing the hemiplegic gait. Force-plates to measure the pressure of the foot on the ground, interrupted-light cameras, oscillographs, electromyographs and special projectors, all contribute to the final development of a gait-training programme. R. Drillis describes similar researches. Discussion on sensory disorders is mainly concerned with blindness and deafness, although muscular problems are dealt with in general.

[1] "Contributions of the Physical, Biological and Psychological Sciences in Human Disability", by Renato Contini, Sidney Fisherman *et alii*; "Annals of the New York Academy of Sciences", Volume 74, Art. 1; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 160, with many illustrations. Price: $3.50.

THE ROLE OF THE PÆDIATRICIAN IN MENTAL ILLNESS.

AT the Ninth International Congress of Pædiatrics held at Montreal in July, 1959, J. P. M. Tizard presented a joint paper[1] on behalf of himself and three other British pædiatricians (T. Stapleton, P. J. N. Cox and J. A. Davis), in which they set out their views on the role of the pædiatrician in mental illness. In the opening paragraph, Tizard and his collaborators agree with the statement that in knowledge and practice of psychiatry pædiatricians have lagged far behind other workers in child care; they state that they wish to discuss the pædiatrician's usefulness and limitations in problems of child psychiatry in the light of their own clinical

[1] *Lancet*, 1959, 2: 193 (August 29).

experience, and to consider how the training of a new generation of pædiatricians may be improved; and they mention that they have been interested to find that, in spite of dissimilarities in other respects, they possess a remarkable unanimity of outlook on the subject discussed.

Tizard and his colleagues then state that serious organic disease, which in the past used to present the most immediately pressing problems, has declined so much that the pædiatrician finds that emotional disorders must now be his major preoccupation. Because psyche and soma interact so closely in childhood, he has to accept the care of children whose symptoms have at least in part an emotional origin—sometimes because psychiatric help is not available, sometimes because the parents can at first see the illness only in physical terms, sometimes because the physical aspects of the illness demand attention in themselves. The pædiatrician must provide a setting in which a parent can talk. Most of the information on which he is to base his decision as to whether he should refer the patient to a psychiatrist or not will have been derived from accurate history-taking, the essential basis of which is a sympathetic understanding that if a mother brings her child to the doctor a problem must exist, even if it is not the overt complaint. It is essential that the doctor's relationship with the parent should be one of personal equality. He must be unhurried and not resort to the question-and-answer type of history taking which is valueless and likely to conceal the real story. His main concern should not be to remove symptoms but to understand what caused them and to prevent serious mental breakdown in adult life. Such symptoms are the child's reaction to stress, and it may be that the children who do not react to what is unsatisfactory in their environment, or whose parents do not become concerned by their symptoms, are in the greatest need of help. In other words, the bulk of future neurotics and psychotics will perhaps be found among the children never seen by the pædiatrician. In most cases of psychological disorder the pædiatrician must try to help the family without the aid of a psychiatrist. It is clear that he can help a good deal but he must know his limitations. Tizard and his collaborators believe that the pædiatrician should not advise parents on the upbringing of their children or in the management of behaviour disorders. Each individual is unique both genetically and in the sum of experience. Since we all differ in capacity and disposition, for no two individuals will the ideal environment be the same. In general they believe that parents who want their children give them what is needed for their emotional development, and that the parent is likely to know far better than the doctor how to deal with a problem of behaviour. If the pædiatrician is not to advise he must be able to explain, to sympathize, to approve but, above all, to listen. The effect on the parents may be that they feel they have received advice, but in fact the pædiatrician has made it easier for them to see the issues and make their own decisions. Tizard and his colleagues state that if the training of doctors is to be improved, psychiatry should no longer be looked on solely as a speciality, and should pervade all teaching of clinical medicine. This ideal could be gradually achieved by introducing psychodynamically trained physicians into the undergraduate medical schools. A change in orientation of the whole medical training could well begin in the pædiatric department, since it is there that emotional growth and family relations can most easily be studied.

Not everyone will agree with the opinions expressed by Tizard and his colleagues. In the lively correspondence which followed their publication, these views on the whole met with guarded approval, though the authors were taxed with over-stating their case, and most correspondents seemed to find their counsel of non-intervention somewhat extreme and impracticable. Several writers took issue with Tizard and his colleagues over their suggestion that a personal analysis might in the future become "a necessary or desirable part of training for most family or pædiatric practitioners". However, moderate over-statement is at times a good way of drawing attention to important matters, and their paper must be regarded as a carefully considered statement on issues which confront every pædiatrician, and provides much food for thought for all those who care to study it.

COMMONWEALTH MEDICAL ADVISORY BUREAU.

A COPY has just arrived of the latest "Summary of Regulations for Postgraduate Diplomas and of Courses of Instruction in Postgraduate Medicine", which is issued each year by the Commonwealth Medical Advisory Bureau in London. We have often referred to this bureau in these columns and the first class service that it provides to assist medical visitors to the United Kingdom from other parts of the Commonwealth, but we repeat the information for the benefit of those not already acquainted with its activities. The Council of the British Medical Association set up the bureau in London in 1948, appointed a committee of management to organize and develop the bureau, and has allotted funds for this purpose. It must not be thought that the bureau is merely a kind of adjunct to post-graduate education, as one of the stated main objects is to welcome overseas visitors and make them feel at home. For this reason the medical director cordially invites all visitors to get in touch with the bureau as soon after their arrival as possible, and to take advantage of the opportunity to talk over any points on which they need advice or assistance. Social functions are held at intervals, and through them or in other ways Commonwealth doctors are enabled to meet each other and to meet prominent members of the profession in the United Kingdom. For those who are mainly concerned with their post-graduate studies, detailed information is available on post-graduate education facilities and on the courses of study necessary for higher qualifications, and the visitor can be put in touch with organizations and authorities who provide post-graduate instruction. The visitor who is not so much concerned with a course of study, but who wishes to see something of the latest medical and surgical techniques can be put in touch with the appropriate specialists. The bureau is also concerned to help in every way possible to solve the problem of finding somewhere suitable to live and for this purpose maintains a register of hotels and lodgings. If requested, the bureau will provisionally book accommodation in an hotel or boarding house, although the visitor is expected to confirm the booking directly with the proprietor. The bureau is also willing to make preliminary inquiries about furnished flats or houses and to provide addresses of these and of estate agents, but it is unable to carry out final negotiations on behalf of visitors. Information can also be given on other matters such as customs regulations and facilities for sport, travel, exhibitions, theatres etc. The bureau asks the visitor to give as long notice as possible of his intended visit to the United Kingdom and advises that information on the following lines would be useful: expected date of arrival, whether accompanied by wife and children, period of stay, objects of visit and ways in which the bureau can give assistance. If advice on post-graduate education is sought, or if visits to hospitals and clinics are desired, information about professional experience should be added. On the visitor's arrival a letter of introduction from the local honorary secretary of the British Medical Association, whilst not essential, is very welcome and may be helpful if a visitor requires references when seeking furnished flats. Copies of the "Summary of Regulations for Postgraduate Diplomas and for Courses of Instruction in Postgraduate Medicine" can be consulted at the headquarters of each of the State Branches of the British Medical Association in Australia. All communications to the bureau should be sent to Dr. R. A. Pallister, Medical Director, Commonwealth Medical Advisory Bureau, B.M.A. House, Tavistock Square, London, W.C.1, England.

Abstracts from Medical Literature.

RADIOLOGY.

Pouch Formation of the Gastric Fundus in Carcinoma of the Cardia.

A. ELKELES (*Brit. J. Radiol.*, June, 1959) presents a series of cases in which pouch formation proved to be a valuable aid in the diagnosis of carcinoma of the cardia. The frequent occurrence of pouch formation in carcinoma of the cardia is probably connected with the fact that the majority of these neoplasms originate in the mesial half of the fundus. The reason why a pouch-like protrusion occurs in cancer of the cardia and not in other parts of the gastro-intestinal tract may be sought in the anatomical and functional peculiarities of this region. The pouch has to be distinguished from other projections occasionally seen in the cardiac region. It is not suggested that the diagnosis of these neoplasms should be based solely on the presence of pouch formation, which should rather serve as a warning to scrutinize the gas bubble for the shadow of a tumour, to search for any distortion of the mucosal folds or any deformity of the left dome, and to study the lower end of the œsophagus for any structural or functional abnormalities. The author points out that pouch formation seems to be one of the early changes associated with carcinoma of the cardia.

Cavitating Pulmonary Metastases.

J. D. CURRAN AND J. M. T. MACCARTHY (*J. Fac. Radiol.*, July, 1959) report a case of cavitating pulmonary metastases from a primary adenocarcinoma of the rectum. The case is considered to be of interest from two aspects: (i) There was a relatively large number of deposits which presented as ring shadows, thin-walled and without evidence of surrounding reaction. This predominantly cystic appearance led the diagnosis away from metastatic tumour, though at first glance this seemed the obvious interpretation, as the distribution was that of a blood-borne condition. Individually, each lesion resembled the thin-walled punched-out cavity sometimes found in an apyrexial tuberculous patient, though the similarity to a cavitating primary squamous-celled carcinoma of the lung might have led to the correct conclusion. Reference to the literature does not suggest that there are any characteristics peculiar to a breaking-down secondary carcinoma. The absence of pleural effusion was remarkable in this case, in which the deposits bulged beneath the pleura all over the lung surface. No collapse from bronchial occlusion was noted. (ii) The mode of production of the cavitary shadow is considered. In the case presented the patient was observed for 11 weeks. Cavities were seen to develop during that time, though no rapid growth took place. Expectoration was not a prominent feature. The absence of infection was in contrast with the behaviour of secondary deposits elsewhere exposed to the atmosphere. At autopsy it was noted that no empty cysts were found. Some communication with the exterior must be accepted in the case of those cavities showing fluid levels at the time of the X-ray examination. It is possible that all the cavities filled up as a terminal event, but their contents suggested material formed over a longer period. A substance with high lipoid concentration composed of necrotic squamous cells and their secretions might be expected to provide enough contrast with closely packed growing tumour cells at the periphery to form a ring shadow without the necessity for a central air space. The authors suggest that the circumstantial evidence that air need not be an essential component of a ring shadow seems strong enough to deserve consideration in interpreting unusual radiographic appearances in the lung.

Radiological Changes in Chronic Bronchitis.

G. SIMON (*Brit. J. Radiol.*, May, 1959) discusses the plain X-ray and the bronchographic appearances in chronic bronchitis. Observation of over a thousand plain skiagrams of patients suffering clinically from chronic bronchitis showed that in nearly half of these there was no evidence of any departure from the normal, and no evidence of any generalized parallel-walled linear shadows which by the width of their lumen, their direction, or their relation to the vessel pattern could be taken to indicate a generalized thickening of the bronchial walls. In a number of cases there were isolated tubular shadows with or without a central translucency or small ring shadows, occupying only a small part of the lung fields, indicating an accompanying bronchiectasis. Such a bronchiectatic area may aggravate or even initiate generalized bronchial disease, but is more probably an incidental complication, being quite common in elderly bronchitic patients with histories of recent major abdominal operations or frank pneumonic episodes. Small ill-defined homogeneous shadows, roughly circular in shape, were also seen in many patients, usually only one or two at a time, and these were often in the upper third of the lungs. Such shadows are often dismissed as old tuberculous foci, but it seems probable that many of them represent non-tuberculous fibrotic scars or nodules. A rarer change was that of widespread honeycomb or reticular shadowing in the lower half of the lungs. Other changes seen with some frequency were old pleural thickenings, old apparently tuberculous scars, localized lobar or segmental bronchiectasis (seen as a shrunken lobe or segment, or as tubular, gloved-finger, honeycomb or ring shadows), and finally the changes of emphysema. A bronchogram, unlike a plain radiograph, usually shows a considerable number of abnormalities in a chronic bronchitic. A common finding is that of small spiky projections from the under-surface of the main or segmental bronchi, particularly the lingular. These projections represent contrast medium in the pit-like depressions formed by the abnormal openings of the mucous gland ducts. They can be seen on bronchoscopy, and are frequently present in other inflammatory lung diseases such as tuberculosis or bronchiectasis. A less common finding is an excessive change in the calibre of an occasional bronchus between deep inspiration and expiration. This may result from abnormalities in the surrounding lung tissue rather than from destructive changes in the wall of the bronchus itself. Similarly, a concertina-like deformity with slight widening of the lumen is probably in part due to shortening of the bronchus from condensation of the surrounding pulmonary tissue. Much more frequent and characteristic of chronic bronchitis are occlusions of the bronchi after about five to eight generations along an axial pathway, or of bronchioles still more distally. The ending of the contrast medium may be clear-cut, with parallel walls like a broken bough. This appearance suggests a functional obstruction to the flow of the medium, either from excessive secretion in the lumen, or to air trapping and absence of the normal inspiratory suck, caused by occlusion of that pathway at a more distal level. An organic occlusion will be probable if the ending is tapered. Sometimes there is a slight dilatation preceding first a narrow area and then the occlusion. Sometimes the bronchus ends in a bulbous expansion. In all these forms of occlusion there is absence of peripheral filling. Another common finding is the abrupt ending of the contrast medium in a small circular pool at the end of a short narrow branch. Such a pool represents a dilated bronchiole, and may vary in diameter from 2 mm. to more than a centimetre.

Congenital Insensitivity to Pain.

F. N. SILVERMAN AND J. J. GILDEN (*Radiology*, February, 1959) report the clinical and radiographic findings in two sisters in whom unawareness of trauma associated with a congenital indifference or insensitivity to pain was responsible for unusual skeletal lesions. The authors refer to a number of reports which indicate that congenital insensitivity to pain is a distinct syndrome of variable severity. Radiological interest centres about the skeletal lesions, which can be divided into three main groups: macro-trauma—gross fractures and their sequels; microtrauma—stress fractures and osteochondroses; various forms of osteomyelitis. Major fractures occur with considerable frequency, usually as a result of adequate trauma. The absence of pain generally suggests pathological fracture, but careful questioning concerning the forces involved usually negatives any undue fragility of bone. Unaffected skeletal structures show no stigmata of systemic bone disease. Pathologic fractures may occur, but only at the site of previously injured and poorly healed bone, and are actually a sequel to a prior unrecognized injury. Various deformities develop as a result of these fractures and are progressive because trauma is compounded on trauma. The lesions, therefore, are not unlike those in the unrecognized skeletal trauma syndrome of infants in whom the repetitive nature of the injury results from the custodians' inadequacy in recognizing the trauma. The lesions are also comparable to those occurring in paraplegics, in whom lack of pain stems from an organic neurological lesion. Because patients with congenital insensitivity to pain are generally much more active than paraplegics, succeeding trauma is much

greater and reparative change is more distorted. Metaphyseal lesions are extremely common; they might be classified as sequels to repeated microtrauma, leading to epiphyseal separation, or they might be considered as counterparts, in children, of Charcot joints in adults. Areas of osteomyelitis occur, usually indolent, and these commonly present as Brodie's abscesses. The radiologist must be alert to identify this syndrome on the basis of skeletal lesions recognizable as a result of repetitive trauma and/or infection. The clinical information may be totally misleading if the important lead of insensitivity to pain is not appreciated.

Radiological Findings in Complications of Diabetes.

R. E. BECK (*Amer. J. Roentgenol*, November, 1959) states that while the diagnosis of diabetes mellitus is not usually incumbent upon the radiologist, his role in detecting the complications of diabetes mellitus cannot be overemphasized. The complications whose signs are manifest radiologically are sometimes so characteristic or occur with such frequency that their presence is almost pathognomonic of the disease. Perirenal gas-forming infection, cystitis emphysematosa, and primary pneumaturia are seldom seen in patients who are not diabetics. Bladder paralysis is sometimes observed as a manifestation of diabetic neuropathy, and renal papillary necrosis is also encountered. The presence of a ripple or cockscrew œsophagus is believed by the author to be a neuropathic manifestation of diabetes mellitus; this finding has not been previously described in relation to this disease. In the pancreas, acute gas-forming infection seldom occurs except in diabetes, diffuse calcification of the pancreas is frequently accompanied by diabetes, and the incidence of carcinoma of the pancreas is increased in diabetes. In the gall-bladder, gas formation in the walls and gas in the lumen may be observed in association with diabetes, but the type, number and incidence of gallstones are apparently unaffected in spite of the altered cholesterol metabolism in diabetes. Changes in the skeletal system associated with diabetes are ascribed to neuropathy, avascular necrosis and infection. None of these changes is absolutely characteristic, but diabetes should be recognized as an ætiological agent in neuropathic joints; premature calcification of peripheral blood vessels leading to atrophic bone changes is noted with such frequency in diabetes that the radiological appearance may be considered quite characteristic; osteomyelitis with gas formation should always suggest diabetes. The pathological processes involved in vascular degenerative changes are identical with those found in the normal aging process, although accelerated. However, in diabetics the degree of calcification in the distal peripheral vessels is often out of proportion to the amount of calcification found in the large elastic vessels. Diabetic neuropathy may involve somatic or autonomic nerves and may cause sensory or motor alterations. Recognition of these functional alterations is of paramount importance for proper management of the diabetic patient, and may be helped by relevant radiological findings. Diabetes mellitus is not a disease which requires radiological confirmation, but its complications can frequently be diagnosed by radiological means.

Acyanotic Tetralogy of Fallot.

T. E. KEATS AND J. M. MARTT (*Amer. J. Roentgenol.*, September, 1959) state that the tetralogy of Fallot can no longer be considered a congenital cardiac defect with uniform clinical and radiological manifestations. To illustrate this point four patients with acyanotic tetralogy of Fallot are presented, with the appropriate catheterization and radiological findings. Not only are the clinical features extremely variable, but the radiological findings are in accordance with the predominant defect; that is, with either the pulmonary stenosis or the ventricular septal defect. Tetralogy of Fallot must now be considered in the differential diagnosis of acyanotic congenital heart disease.

RADIOTHERAPY.

Management of Hodgkin's Disease.

J. C. COOK *et alii* (*Amer. J. Roentgenol.*, October, 1959) have analysed the effects of the combined use of nitrogen mustard and X-ray therapy for Hodgkin's disease, in terms of long-term survival and palliation, and have compared these results with those achieved by radiation therapy alone. Between 1922 and 1952, 347 patients with Hodgkin's disease were treated at their clinic, with an over-all five-year survival rate of 34·6%. The authors have been using nitrogen mustard since 1946, and during the period 1947–1952, 31 patients were treated by X-ray therapy alone, and 85 by the combined method. There is little difference between the over-all five-year survival rate for this period (38·4%) and that for 1929–1934 (36·1%). In the 1947–1952 group the five-year survival rate among the patients treated by radiotherapy alone was 37·2%, and that among patients receiving combined therapy was 39·2%. This difference would not appear to be significant, except that in the patients in whom the combined method of treatment was used there was already more than one lymph node group affected or other signs of generalized involvement. The authors conclude that the combined method has some advantage.

Carcinoma of the Tonsillar Area.

N. DU V. TAPLEY *et alii* (*Amer. J. Roentgenol.*, October, 1959) present a series of 88 cases of carcinoma of the tonsillar area seen at the Columbia Presbyterian Medical Centre. Carcinoma of the tonsil comprises about 1·5% to 3% of all malignant conditions, and there are about four epitheliomas for every lymphosarcoma in this area. Eighty-one patients received radiation therapy, the seven untreated having been referred for diagnosis only. X-ray therapy alone was used for 62 patients, X-ray therapy and interstitial insertion of radium for nine, and X-ray therapy and radical neck dissection was carried out on eight patients. Surgery alone was the selected treatment for two patients, but neither survived for five years. There were 17 five-year survivals in the group of 62 patients and two five-year survivals in each of the other two groups. The net five-year survival rate for the 81 patients was 32%, on the assumption that six untraced patients had all died. The authors then consider survival in relation to length of history and degree of histological differentiation, neither of which had any influence on the survival rate. There were 52 males and 13 females whose tumour had been diagnosed more than five years previously, and here there was a very significant difference; 11 males (21%) survived as against 10 females (77%). This difference in length of survival between the sexes has been previously noted in France and England.

Lymphosarcoma of the Stomach.

B. L. REDD (*Amer. J. Roentgenol.*, October, 1959) reports on a series of 13 cases of lymphosarcoma of the stomach and reviews the literature. The apparent increased incidence of the disease he considers is due to more accurate diagnosis. The symptomatology is not sufficiently characteristic to permit differentiation from other gastric neoplasms. Radiological or gastroscopic examination also seldom differentiates the lesion. He considers radical surgical removal is the treatment of choice. When the lesion is incompletely removed or there is evidence of lymph node metastasis, radiation therapy should be given and may effect complete control of the lesion. A review of the literature shows in one collected series of 474 cases a five-year survival rate of 10·5%, which is considered low. In another series of resectable tumours there was a five-year survival rate of 58%. In the author's series of 13 patients, eight are living at intervals of from nine months to six years and nine months after treatment.

Prevention of Radiation Lung Damage.

A. G. W. WHITFELD AND W. H. BOND (*J. Fac. Radiol. (Lond.)*, October, 1959) state that the occurrence of radiation damage to the lungs after deep X-ray therapy to the thorax is well known. This may result in permanent diminution in exercise tolerance, a troublesome dry cough, and some dyspnœa which may persist for a month after the conclusion of radiotherapy, but the radiation damage is never fatal and its residua are not incompatible with a normal life. When wide fields are used or when dosage is excessive, widespread and possibly fatal lung damage can ensue. The authors go on to discuss the use of anticoagulants and steroid therapy to try to prevent such damage. The results in eight patients given anticoagulants were disappointing (three showed damage) and they conclude that they are by no means a safeguard against the danger of radiation damage. The results in the group given steroids (75 mg. of cortisone daily) as a preventive measure were also poor, which was disappointing as steroids are of value in established radiation lung damage. The authors conclude that it is advisable to use wide thoracic fields or chest baths only when such techniques are absolutely essential.

On the Periphery.

SHAKESPEARE THE SYPHILOLOGIST.

Some are born with syphilis, some acquire syphilis, and some have syphilis thrust upon them.

(With apologies to Malvolio.)

THE successful introduction of penicillin by Mahoney *et alii* (1945) for the treatment of syphilis has almost made "specific infection" a forgotten disease. However, over the past year or so, there has been a disquieting increase in the incidence of this malady, so that it is as well to reflect that this disease was once the scourge of the white world.

Syphilis first appeared in Europe about the time of the return of Columbus from the New World (1493). It spread rapidly from Italy in the wake of the armies of Charles V, finally assuming pandemic proportions in France and Spain by the middle of the sixteenth century. The spread to England was equally rapid and dramatic. Occurring in an immunologically unprotected population, the manifestations of syphilis in Shakespeare's England were often spectacular and sometimes repulsive, and it is not surprising that the great dramatist often used syphilitic word-portraits to point the bizarre or emphasize the revolting.

Shakespeare's observations on syphilis were so accurate, and in some instances so far ahead of his time, that there is a school of thought which maintains that he studied medicine during the "hidden years". I think St. Clair Thomson's opinion sounds the more plausible:

> There is no need to surmise that Shakespeare studied Medicine, but we have abundant material to show that he had a knowledge and comprehension of it that was simply astounding.

It is of interest that Shakespeare was closely associated with a number of medical men, at least three of whom might be classed as eminent. Sir William Harvey (whom he mentions in a sonnet) needs no introduction, and the works of Shakespeare contain many references to the circulation of the blood. Dr. John Hall, his son-in-law, was a capable physician and pathologist. His case book, "Select Observations on Human Bodies", which includes some sixty autopsy reports, bears witness to an inquiring mind and considerable industry. He also knew Dr. John Lodge, the playwright.

Shakespeare had developed to a high degree the faculty of acquiring technical knowledge from those better informed than himself. Consider his understanding of such diverse subjects as law, botany, warfare, biology and navigation—and these all in one whose only claim to conventional education was "a little Latin and less Greek". It seems probable that Shakespeare freely discussed medical subjects with at least Hall and Harvey, and supplemented these combined observations with his own acutely developed powers of perception.

In the early years of the seventeenth century, Shakespeare went through a period of great mental and possibly physical torment. This time, known as "the period of the dark vision", gave us such immortal tragedies as *Timon of Athens, Othello, Measure for Measure, Hamlet* and *Troilus and Cressida*, a group of plays abounding in morbid references to the "infinite malady"—so much so that it has been suggested that the great playwright himself had suffered from syphilis at the time. Other supportive facts—the early fertility and later barrenness of his marriage, the relative deterioration in his work over the last five years of his life, and his demise probably from a cerebral catastrophe—do not seem to be conclusive enough to substantiate a diagnosis of specific infection.

On the other hand, it does appear that Shakespeare did engage in an illicit relationship with "The Dark Lady of the Sonnets";[1] and while he was at least faithful to her, the same cannot be said of the Dark Lady.

It is thus probable that in one way or another Shakespeare did run the hazard of venereal infection.

Shakespeare must have seen considerable evidence of the then dread disease amongst his colleagues at the theatre and his literary contemporaries, including the "University Wits". Green died of syphilis, and remorsefully writes of his experiences in "A Groat's Worth of Wit", and it is possible that Marlowe also contracted this disease.

[1] She was probably Mary Fitts, Lady-in-Waiting to Queen Elizabeth I.

The designation of syphilis as the "French disease" (*morbus gallicus*) was current throughout Europe about this time:

> *Pistol*: Doth fortune play the housewife with me now? News have I that Nell is dead i' the spital of the malady of France.
>
> HENRY V, v. 1. 84.

However, those in France might prefer the name "Spanish sickness" or even "Neapolitan disease".

> *Thersites*: After this, the vengeance on the whole camp or rather the Neapolitan bone-ache; for that, methinks, is a curse dependent on those that war for a placket.
>
> TROILUS AND CRESSIDA, ii. 3. 20.

The ætiological linkage between youth, promiscuity, and venereal infection is inferred by Shakespeare in the following:

> *Falstaff*: A man can no more separate age and covetousness, than he can part young limbs and lechery; but the gout galls the one, and the pox pinches the other; and so both the degrees prevent my curses.
>
> HENRY IV, i. 2. 260.

The venereal propagation of syphilis is referred to in the brothel scene from *Pericles*:

> *Marina*: For me that am a maid, though most ungently fortune have plac'd me in this sty, where, since I came disease have been sold dearer than physic.
>
> PERICLES, iv. 6. 105.

Falstaff expounds the matter in more detail:

> *Falstaff*: You make fat rascals, mistress Doll.
>
> *Doll*: I make them! Gluttony and disease make them; I make them not.
>
> *Falstaff*: If the cook help to make the gluttony, you help to make the diseases, Doll: We catch of you, Doll, we catch of you; grant that, my poor virtue, grant that.
>
> HENRY IV, II, ii. 4. 44.

Infection by kissing is alluded to in this passage:

> *Timon*: This fell whore of thine hath in her more destruction than thy sword, for all her cherubin look.
>
> *Phrynia*: Thy lips rot off.
>
> *Timon*: I will not kiss thee: then the rot returns to thine own lips again.
>
> TIMON OF ATHENS, iv. 3. 61.

There is also an allusion to the idea then current that venereal disease may be got rid of by transferring it to a healthy subject.

The danger of contamination of the lips, by a cup, is referred to by Lucio:

> But whilst I live, forget to drink after thee.
>
> MEASURE FOR MEASURE, i. 2. 39.

Timon catalogues some of the manifestations of secondary syphilis. He includes gonorrhœa amongst these, as the phrase "burn him up" bears witness. This was the current belief for more than two centuries.

> *Timon*:
>
> Be whores still; and he whose pious breath seeks to convert you,
> Be strong in whore, allure him, burn him up;
> Let your close fire predominate his smoke,
> And be no turncoats: Yet may your pains six months
> Be quite contrary: and thatch your poor thin roofs
> With burdens of the dead; —Some that were hang'd.
> No matter, —wear them, betray with them, whore still,
> Paint, till a horse may mire upon your face;
> A pox of wrinkles!
>
> TIMON OF ATHENS, iv. 3. 141.

The meaning of the phrase "yet may your pains, six months, be quite contrary" is somewhat obscure. It may be understood by taking the word "contrary" to mean "repugnant to", a significance which, in old authors, it sometimes bears. The six months would thus refer to the average duration of the secondary exanthematous stage of the disease, and some colour is given to this by the suggestions which immediately follow, to supply the loss of hair by wearing of a wig, and to hide the cutaneous appearances by painting the face (Bucknill, 1860).

Many jesting allusions occur to symptoms of syphilis, as in the following: The baldness (alopecia) produced

by this disease came to be known as the "French crown", and the play on the word crown as a piece of money explains the joke . . . (McGeoch, 1955).

This is exemplified in the following conversations:

Lucio: Behold, behold, where Madame Mitigation comes!

First Gentleman: I have purchased as many diseases under her roof as come to—

Second Gentleman: To what, I pray?

First Gentleman: Judge.

Second Gentleman: To three thousand dolours a year.

First Gentleman: Ay, and more.

Lucio: A French crown more.

MEASURE FOR MEASURE, i. 2. 46.

The most fearful invocation of the mad Timon is the one which he addresses to the rapacious courtesans, including, as it does, a complete list of the tertiary effects of venereal spirochæte infection.

Timon:

Consumptions sow
In hollow bones of man: strike their sharp shins,
And mar men's sparring. Crack the lawyer's voice,
That he may never more false title plead,
Nor sound his quillets shrilly: Hoar the flamen
That scolds against the quality of flesh,
And not believes himself: down with the nose,
Down with it flat; take the bridge quite away of
him that his particular to foresee
Smells from the general weal; make curl'd pate
ruffians bald;
And let the unscarr'd braggarts of the war
Derive some pain from you: Plague all:
That your activity may defeat and quell
The source of all erection. There's more gold:
Do you damn others, and let this damn you,
And ditches grave you all!

TIMON OF ATHENS, iv. 3. 152.

Bucknill (1860) wrote:

> *Among all these symptoms of* "the malady of France" the only ambiguous one is the first, in which the word "consumption" seems to be somewhat *indefinitely applied. It seems most probable that* consumptions in the hollow bones means *disease of* the bones of the cranium which form that which may *essentially be called* "the hollow bone of the body".

Disease of these bones we know to have been very common in olden times, giving the clinical picture of cranial tabes.

Painful nodes on the shin-bones (periostitis) are, no doubt, meant by the expression: "strike their sharp shins".

Venereal ulcerations of the larynx are next referred to: "Crack the lawyer's voice", etc. The cleric (Flamen) is made to bear the mark of infamy in the form of the white scaly skin eruption, probably a psoriasiform syphilide.

The next symptoms apply to that hideous disfigurement of chronic syphilis, loss of the nose; even its structure is referred to: "take the bridge away". The fearful list of the effects of chronic syphilis is concluded by impotence and baldness; the former is especially remarkable, as it was not observed to be a symptom of the complaint until a date shortly before Shakespeare wrote.

Syphilis invading the bone seems to have been especially common at this time:

Clown: Why, masters, have your instruments been in Naples, that they speak i' the nose thus?"

OTHELLO, iii. 1. 3.

In this case, the bone marrow would appear to have been affected:

First Gentleman: Thou art always figuring diseases in me, but thou art full of error; I am sound.

Lucio: Nay, not as one would say, healthy, but so sound, things that are hollow; thy bones are hollow: impiety has made a feast of thee.

MEASURE FOR MEASURE, i. 2. 56.

It seems also from the context that even the joints were invaded by the spirochæte:

First Gentleman: How now! which of your hips has the most profound sciatica?

MEASURE FOR MEASURE, i. 2. 63.

Cutaneous manifestations of syphilis have been mentioned previously. To these may be added syphilitic rupia:

Timon:

Of man and beast the infinite malady
Crust you quite o'er!

TIMON OF ATHENS, iii. 6. 109.

Tertiary syphilides also are graphically described in the Duke's indictment of Jacques:

Duke Senior:

Most mischievous foul sin, in chiding sin, for thou
thyself hast been a libertine,
As sensual as the brutish sting itself;
And all the embossed sores and headed evils,
That thou with license of free foot has caught,
Wouldst thou disgorge into the general world.

AS YOU LIKE IT, ii. 7. 65.

Included amongst the following catalogue of diseases, including "the rotten disease of the south", are apoplexy and cirrhosis, not to mention sciatica and intractable bone pain, all of which could have been caused by the ubiquitous spirochæte:

Thersites: The rotten diseases of the south, the guts *griping, ruptures, catarrhs, loads o' gravel i' the back,* lethargies, cold palsies, raw eyes, dirt rotten livers, wheezing lungs, bladders full of impostume, sciaticas, *lime-kilns i' the palm, incurable bone-ache, and the* rivelled fee-simple of the tetter, take and take again such preposterous discoveries.

TROILUS AND CRESSIDA, v. 1. 20.

Reference has already been made to gonorrhœa as being part of the "syphilis complex", and, indeed, it was associated with specific disease by physicians from the earliest times under the name "lues venerea". This misconception was perpetuated by the great John Hunter (1718-1783), and it was not until Phillip Ricord (1799-1889)[1] that the mistake was finally proven. Shakespeare was thus in good company in thinking of gonorrhœa and syphilis as one disease, and I leave him there with the following two references to Neisserian infection:

Thersites: Lechery, lechery: still, wars and lechery, nothing else holds fashion: a burning devil take them!"

TROILUS AND CRESSIDA, v. 2. 192.

Gonorrhœa was called the "brenning" or "burning" (see "Murray's English Dictionary"), and so the word lent itself to various puns. Thus in *A Comedy of Errors* we find:

Dromio of Syracuse: Master, is this Mistress Satan?

Antipholus of Syracuse: It is the devil.

Dromio of Syracuse: Nay, she is worse, she is the devil's dam, and here she comes in the habit of a light wench: and thereof comes that the wenches say "God damn me!": and that's as much as to say "God make me a light wench." It is written, they appear to men like angels of light: light is an effect of fire, and fire will burn: Ergo, light wenches will burn. Come not near her.

COMEDY OF ERRORS, iv. 3. 50.

The reader will note that no reference has been made to cardio-vascular syphilis or neurosyphilis. The association of specific infection with arterial disease was first noted by Morgagni (1682-1771) and neurosyphilis by Fournier (1832-1914), both discoveries well after the time of Shakespeare.

The treatment of syphilis was by this time well known to the laity. The question within the profession as to whether venereal diseases should be treated by physician or surgeon was hotly disputed, especially by the French. Both were unwilling to let such a lucrative department slip out of their hands. In *Pericles, Prince of Tyre*, we find that the cure of such disorders fell to the surgeon:

Lysimachus: You may so: 'tis the better for you that your resorters stand upon sound legs. How now! wholesome iniquity, have you that a man may deal withal, and defy the surgeon?

PERICLES, PRINCE OF TYRE, ii. 6. 26.

Treatment in this era may be summarized under the headings of diet, the tub and the bath:

Timon:

Be a whore still! they love thee not that use thee:
Give them diseases, leaving with thee their lust.
Make us of thy salt hours: season the slaves

[1] Ricord, a man of Hunterian stature, was described as the "Voltaire of pelvic literature", of whom it was said ". . . he would not have hesitated to order a course of blue pills for the Vestal Virgins" (Castiglioni).

For tubs and baths: bring down rose-cheeked youth
To the tub and the diet.

TIMON OF ATHENS, iv. 2. 82.

Treatment by diet alone is mentioned by Pompey in this passage:

Why, very well: I telling you then, if you be remembered, that such a one and such a one were past cure, of the thing you wot of, unless they kept very good diet, as I told you.

MEASURE FOR MEASURE, ii. 1. 117.

"Diet" entailed non-consumption of "sack and sherris" as well as eating certain empirical foods of no particular therapeutic value.

In many parts of Shakespeare's plays, "diet" is used to mean "mode of living"—"a good diet" implying a continent existence, free from excesses of any kind.

The "tub" is referred to in the following:

Pistol:

O hound of Crete, thinks't thou my spouse to get?
No; to the spital go,
And from the powdering tub of infamy,
Fetch forth the lazar kite of Cressid's kind,
Doll Tearsheet she by name, and her espouse.

KING HENRY V, ii. 1. 77.

This was the tub in which the patient was exposed, naked, to the fumes of cinnabar (red sulphide of mercury). This mineral, when thrown on a hot iron plate, volatilized and condensed in the form of a powder on the body of the patient. Sometimes it was massaged into the skin by assistants. The surgeons of Shakespeare's time, Clowes, Woodall and Paré, speak of this mercurial fumigation as if it was in common use although they appeared to prefer inunction of quicksilver. Woodall writes: "Cinpabar, which is used in fumes for the pox, is a deadly medicine, made of half quicksilver and half brimstone by art of fire."

Again, in reference to the "tub":

Lucio: How doth my dear morsel, thy mistress? Procures she still, ha?

Clown: Troth, sir, she hath eaten up all her beef, and she is herself in the tub.

MEASURE FOR MEASURE, iii. 2. 58.

Hot baths and the cure by sweating are mentioned:

Pandarus:

Till then I'll sweat, and seek about for eases,
And at that time bequeath you my diseases.

TROILUS AND CRESSIDA, v. 10. 56.

One wonders whether the very hot baths used may not have inadvertently been employing hyperthermia in the treatment of syphilis, thus predating von Jauregg by some three centuries. The sweating, although part of the régime, was probably useless, and was stimulated by the ingestion of guaiacum and sassafras.

It seems as if the treatment of syphilis was on a fairly sound basis in Shakespeare's age, at least compared with other therapeutic endeavours of the time, and all this occurred within a century of the appearance of this new malady in Europe. Treatment remained substantially unaltered until Ehrlich first entered the field of chemotherapy by the introduction of "Salvarsan" some three centuries later.

Conclusion.

In conclusion, let me repeat a previous statement (McGeoch, 1955):

A good deal of what I have written is controversial and should you feel disposed to disagree, do so by all means, bearing in mind that "all excursions in search of Shakespeare are essays in conjecture, and anyone may compete".

I may also quote St. Claire Thomson (1916):

The science of medicine progresses, but human nature remains the same. The foundations of physiology are fixed. Shakespeare's plays will be read by physicians when every medical treatise of the present year will have been completely eclipsed, and the works of this master of medicine will continue to be studied by future generations.

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British Medical Association.

VICTORIAN BRANCH: SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held on May 6, 1959, at St. Vincent's Hospital, Melbourne. The meeting took the form of a number of clinical demonstrations by members of the honorary staff of the hospital.

Emergency Abdominal Surgery in Aged Patients.

MR. PETER RYAN presented a demonstration on the subject of emergency abdominal surgery in patients aged over 70 years.

He showed charts giving the details of 119 emergency abdominal operations in that age group which he had performed over the past four years. The overall mortality rate, 29%, though high, compared favourably with overseas figures. Mr. Ryan said that the most common emergencies encountered had been strangulated hernia, complications of peptic ulcer and complications of carcinoma of the colon, each 25% of the total number; there were only 11 cases of acute appendicitis. The commonest causes of death were peritonitis and pulmonary complications which together accounted for more than half the number, while one of every three deaths in males was due to renal failure associated with concomitant prostatomegaly and its sequels.

Mr. Ryan went on to say that he had made an attempt to analyse the deaths in his series from the point of view of preventibility. From that standpoint, by far the chief remote cause of death was delay in presentation or treatment; half the deaths fell in that category. Unfortunately, all of those patients had essentially curable surgical lesions and ought to have been saved had they come earlier to operation. Mr. Ryan concluded that the well-known indifference to suffering of older people often led to delay in their presentation, while their doctors often hesitated to advise operation, forgetting that at no age was delay in emergency surgery more lethal.

Mr. Ryan finally showed 11 of his patients, aged from 71 to 84 years, who had recently undergone major abdominal emergency surgery.

Subtrochanteric Osteotomy for Osteoarthritis of the Hip.

MR. B. J. DOOLEY showed two patients who had undergone subtrochanteric osteotomy with internal fixation done for osteoarthritis of the hip 10 years earlier. Both had been completely relieved of their pain. He said that in Mr. T. King's series of 100, 75% had been relieved of their pain. Internal fixation avoided the need for a hip spica and allowed early mobilization. The operation was less severe than arthroplasty and arthrodesis. It preserved hip stability and movement and decreased Trendelenburg limp with adduction of the upper fragment, thereby lengthening the abductors and increasing their efficiency. It disturbed hip muscles minimally.

Mr. Dooley went on to say that the essential features of the operation were adduction of the upper fragment and displacement inwards of the lower fragment with internal fixation, the result being that the line of weight-bearing was displaced medially and there was a bar to further adduction. Osteotomy corrected any deformity and brought a new section of the femoral head into the line of weight bearing. The only indication for operation was severe pain.

Surgical Causes of Dysphagia.

MR. J. CLAREBROUGH, from the thoracic unit, presented a demonstration of the surgical causes of dysphagia. He said that, in considering those conditions which caused dysphagia by the production of muscle spasm in the œsophagus, it was important to remember that the era of spasm and the site to which dysphagia was referred might not correspond to the site of the lesion. That was not uncommonly seen in cases of lower œsophageal disease, such as hiatus hernia, when reflux spasm of the crico-pharyngeal sphincter gave rise to symptoms of dysphagia referred to the upper end of the œsophagus. The practical importance of that fact was that, in the investigation of dysphagia referred to the upper end of the œsophagus, a barium bolus was usually not sufficient. A full barium meal with suitable posture of the patient might reveal as the cause an unsuspected hiatus hernia at the lower end.

Mr. Clarebrough then discussed the problem of "cork-screw œsophagus". He said that in a certain proportion of cases, a cause such as a hiatus hernia would be found, but in others no exciting factor could be discovered. In that group, antispasmodics would often be of considerable help. If they were not, then an extended Heller's operation should be considered for patients who had severe symptoms.

Mr. Clarebrough illustrated the problem of dysphagia in hiatus hernia by a series of X-ray films. He said that that symptom might arise in the early stages of the disease as a result of muscle spasm consequent on peptic œsophagitis of the mucosa. Under those circumstances, medical treatment might result in some improvement. If it did not result in complete disappearance of the symptom, then the patient ran a very high risk of future stricture formation, and surgical repair was important. In the para-œsophageal or combined hernia dysphagia had a greater significance, for there it generally meant that the hernia was mechanically unstable, and medical measures would not have any effect on the symptom. Those patients ran the risk of gastric obstruction and even strangulation. The X-ray films of a man, aged 71 years, were presented; they showed the presence of a combined hernia in 1955. In 1957 he complained of dysphagia, which did not respond to treatment. He was finally admitted to hospital six months later, with acute œsophageal obstruction due to incarceration of the stomach in the hernial sac and strangulation of portion of the stomach wall. Mr. Clarebrough said that once dysphagia occurred in a combined or para-œsophageal hernia, repair was mandatory.

Mr. Clarebrough then discussed the treatment of carcinoma of the œsophagus, and showed X-ray films of examples of the condition in the upper, middle and lower thirds. In the upper third, the treatment by external supervoltage therapy followed by the insertion into the growth of a plastic tube containing a source of radiation was illustrated. Mr. Clarebrough said that that usually resulted in a stricture which could be treated by dilatation or intubation. In the middle and lower third, excision with œsophago-gastrostomy and œsophago-jejunostomy was illustrated.

Mr. Clarebrough finally quoted two cases to illustrate the management of inoperable œsophageal neoplasms and œsophageal obstruction due to secondary malignant glands by intubation with plastic or metal tubes. The first patient, aged 56 years, had presented in 1955 with a history of dysphagia. X-ray examination with a barium bolus and œsophagoscopy revealed a large carcinoma of the middle third of the œsophagus, which was treated by œsophagectomy and œsophagogastrostomy. The patient was well, having gained three stone in weight. The second patient, aged 31 years, had swallowed hydrochloric acid in 1956 and sustained a stricture of the lower two-thirds of the œsophagus. The condition was treated by self bouginage and dilatation through an œsophagoscope at intervals for 18 months. However, the stricture became very dense and almost impossilbe of dilatation. Excision of the lower two-thirds of the œsophagus had been performed with œsophagogastrostomy. At the time of the meeting the patient was swallowing normally and had gained five stone in weight.

A meeting of the Victorian Branch of the British Medical Association was held on May 20, 1959, at the Commonwealth Serum Laboratories, Parkville. The meeting took the form of a demonstration by members of the staff of the Laboratories.

Poliomyelitis Vaccine Production and Methods of Safety Testing.

MR. C. R. MCDONALD and MR. W. D. COLLINS demonstrated the techniques used in the manufacture of poliomyelitis vaccine, and the principles of the safety testing of the finished product. The various steps of the process were illustrated with a set of coloured photographs. The stages shown were the initial treatment of monkey kidney, the growth of monkey kidney tissue in toxin bottles, and the proliferation of virus in that tissue. The photographs then showed filtration and inactivation procedures, and finally the sampling and testing of the vaccine for live virus in tissue culture. Some aspects of the process were demonstrated more fully. Culture bottles containing actively growing preparations of monkey kidney tissue were viewed under a stereomicroscope. The effect of the virus on cells of the tissue culture could be seen where virus degeneration of the cells was early and also where it was advanced.

A working exhibit displayed the filtration of virus fluids prior to their inactivation with formalin. Virus was filtered into a 120-litre stainless steel tank, through glass filters of various porosities. It was stated that virus was subsequently inactivated in that vessel by the addition of formalin at controlled temperature and pH.

The principles of safety testing in tissue culture and the assay of virus before and during inactivation were demonstrated, with the aid of roller tubes containing infected monkey kidney tissue. The tissue cells in tubes infected with very small doses of virus particles showed the early stages of degeneration.

Finally, the following possible future developments in combined vaccines were illustrated: (i) combination of poliomyelitis vaccine with triple antigen for immunization of young children; (ii) combination of poliomyelitis vaccine with diphtheria toxoid and tetanus toxoid for immunization of older children; (iii) combination of poliomyelitis vaccine with tetanus toxoid for immunization of adults.

Influenza Virus Vaccine Production.

MR. H. K. HARCOURT demonstrated a number of aspects of production of influenza virus vaccine. These were illustrated by means of large illuminated colour transparencies depicting actual operations with embryonated eggs, and by a display of eggs and apparatus used at various stages of egg handling. The display included descriptive notes and information illustrating the coverage afforded by the vaccine against all known types of influenza. Leaflets described the dosage and administration of the vaccine.

Assay of Virus Vaccines.

MR. F. WARBURTON demonstrated various techniques used in the assay of virus vaccines; they included hæmagglutination tests, complement fixation tests, hæmagglutination inhibition tests and pock production on the chorio-allantoic membrane of embryonated eggs. The isolation and typing of viruses, with particular reference to the influenza virus, were also demonstrated. Possible future developments with virus vaccines were discussed, including adenovirus vaccines, smallpox vaccine derived from vaccinia virus cultivated on the chorio-allantoic membrane of embryonated eggs, and dried smallpox vaccine.

Production of Bacterial Vaccines.

MR. E. R. BUSBY demonstrated some techniques involved in the production of bacterial vaccines for human use. T.A.B. vaccine was used as an example. The display included the following features: lyophilization of cultures; isolation of virulent organisms after mouse passage; sugar tests for identification of cultures; phage tests for Vi antigen; agglutination tests; apparatus used in harvest collection; samples of bulk, bottled and packed vaccines.

B.C.G. Vaccine Production.

MR. C. L. BIGGS demonstrated the production of dried B.C.G. vaccine (living) for the prevention of tuberculosis. The extreme care taken during preparation and the extensive tests performed to ensure a safe and potent product were stressed. It was pointed out that improved methods of production and cool storage during transport had enabled that dried vaccine to be widely used in New Guinea and other distant places. The results of clinical trials indicated the efficacy of the vaccine.

Insulin Production.

MR. M. R. HINTON and MR. MCDONNELL described the process for the production of insulin, and conducted those present through the plant. It was pointed out that while the process itself was most effective and produced high purity insulin in very good yields, the plant was only an interim unit. The installation of a new plant utilizing the latest equipment was about to commence at a new site.

The importance of using fresh, good quality pancreas glands was emphasized; since it was pointed out that that was a major factor in achieving high yields.

It was stated that losses of insulin during extraction and purification were cut to a minimum by the avoidance of reagents and equipment which brought about denaturation of the insulin. A feature of the equipment used was a special low-temperature evaporator, which removed the alcohol from the gland extract under high vacuum. The heating system was such that the insulin could not be subjected to temperatures which led to loss of activity. Final purification was achieved by the use of two separate crystallizations, which gave rise to a high-purity insulin assaying 27 to 28 units per milligramme, as compared with the B.P. requirement of 22 units per milligramme. The purity of the product had been confirmed by counter-current analysis by the use of the Craig technique, and compared more than favourably with imported insulins.

The necessity for the correct storage of dispensed insulin was stressed, and it was stated that insulin should be stored at as low a temperature as possible above freezing point. For practical purposes that meant storage in a refrigerator (not in the freezing chamber). Room-temperature storage of insulin could lead to loss of activity in the case of regular insulin, and to modification of the protamine insulin complex in the case of the combined insulins, so that their normal period of activity was significantly reduced. Freezing of the combined insulins produced a similar result.

Standardization of Endocrine Products.

MR. A. H. MENGONI and MISS WADESON demonstrated the methods of assay. It was pointed out that products were assayed in comparison with the International Standard for that particular product. Demonstrations covered the various stages of assaying insulin and corticotrophin. It was shown that for insulin two methods were used: (i) the rabbit blood sugar method, in which the hypoglycæmic effect produced by the test insulin was compared with that produced by the standard insulin; (ii) the mouse convulsion method, in which convulsions produced by the test insulin were compared with those produced by the standard insulin. Results were calculated by statistical methods. In assaying a batch of insulin at the Commonwealth Serum Laboratories (C.S.L.), approximately 2500 mice were used and hundreds of rabbit blood sugar estimations were carried out.

The method determining the isophane ratio for the preparation of isophane insulin was also demonstrated, and the microscopic difference between isophane insulin (crystalline) and protamine zinc insulin (amorphous) was shown.

It was stated that in assaying corticotrophin, potency was determined by comparing the depletion of adrenal ascorbic acid produced by the test corticotrophin with that produced by the standard corticotrophin in hypophysectomized rats. Stages of hypophysectomy of rats and estimation of ascorbic acid were demonstrated.

Penicillin Production.

MR. J. FOLEY presented exhibits displaying various aspects and processes in the manufacture of crystalline benzyl penicillin G (sodium salt). Mr. Foley also demonstrated the biological assay of penicillin. The following items were exhibited: a lyophilized pellet, a seed tube, germinated seed preparations and smear together with a vegetative seed preparation and smear. A seed tank and fermenter culture were demonstrated, as well as a display of a succession of extracts, which were, in order: filtered broth, amyl acetate extract, buffer acetate extract, ethylene dichloride extract, aqueous extract (soda) and aqueous extract and butanol. The final crystals of the product were displayed.

Penicillinase.

MR. A. G. MATHEWS demonstrated the production and purification of penicillinase, a bacterial enzyme which destroyed the activity of penicillin by converting it to penicilloic acid. Methods were shown for testing the ability of bacteria to produce penicillinase. In Got's method, the test bacteria were streaked on plates of penicillin containing nutrient agar, pre-seeded with penicillin-sensitive bacteria. Production of penicillinase was indicated by the growth of the sensitive bacteria in the area around the streak where penicillin had been destroyed by penicillinase produced by the test organisms. In Kornlein and Koch's method, plates containing procaine penicillin suspended in nutrient agar were used. Production of penicillinase was indicated by the development of clear zones around the streaks, due to the progressive solution of procaine penicillin during its destruction by the enzyme.

Apparatus for the mass culture of *Bacillus subtilis* was shown. Very high yields of penicillinase were reported to be obtained.

A sterile filtrate of the culture was displayed under the name "Labpenase". It was pointed out that that material was intended for laboratory use only—for example, for the destruction of the activity of samples of penicillin products before inoculation into sterility test media, or for the pre-cultural treatment of clinical specimens from patients receiving penicillin therapy.

Methods for purification of the enzyme by selective adsorption and elution were demonstrated. The purified enzyme was displayed under the name "Compenase". It was stated that "Compenase" was to be used for the treatment of penicillin sensitivity reactions, and was at present undergoing clinical trials.

Finally, spectrophotometric and agar-diffusion methods for the assay of penicillinase were demonstrated.

Immunization in Infancy—Reactions to Immunizing Agents.

DR. T. E. B. KEEN said that vaccination for smallpox could be performed at any time during the first year of life, and the age of 1 to 2 months appeared the preferable time. Between the ags of 3 and 5 months, three injections of triple antigen should be given, followed by two injections of poliomyelitis vaccine between the ages of 6 and 7 months. At the age of 18 to 24 months, the child should have a booster dose of triple antigen, and between 14 and 24 months a further dose of poliomyelitis vaccine. A booster dose of combined diphtheria and tetanus toxoids should be given prior to the child's entering school. As the rapidity of air travel allowed persons to enter Australia during the incubation period of smallpox, vaccination for all infants was recommended. Charts were displayed which demonstrated the efficacy of smallpox vaccination.

Dr. Keen went on to say that the mortality of whooping-cough under the age of one year had decreased over the past decade. That was probably associated with the development of chemotherapeutic and antibiotic agents which controlled secondary infection; but immunization against pertussis might be an important factor. The morbidity associated with that disease was still high, and the number of admissions to Fairfield Infectious Diseases Hospital was the same as in the decade 1930-1940. Immunization which commenced at three months gave early protection against the disease, and that immunity would be maintained by a further dose at the age of 12 to 24 months. As the considerable morbidity occurred only in young children and reactions to pertussis antigen were high, the administration of further doses was not recommended. Clinical trials had produced various results on the efficacy of pertussis immunization. However, the thorough trials carried out by the Medical Research Council showed conclusively that pertussis immunization was effective in prevention and modification of the disease. The intracerebral mouse test had shown close correlation with clinical protection, and the variable results in the literature might be considered the result of varying potency in different vaccines.

Tetanus immunization was recommended as the only effective measure to prevent tetanus, since that disease frequently occurred with minor wounds, and the administration of tetanus antiserum for prophylaxis had many disadvantages. The efficacy of active immunization had been confirmed by the results in the armed forces in World War II.

Dr. Keen then said that the incidence of diphtheria was variable, but there had been a general fall over recent years. The efficacy of immunization against that disease was difficult to estimate; but there had been a greater fall in the incidence of the disease in countries which had a well-organized immunization campaign. Sub-clinical infection might maintain the immunity, but in a well-immunized community greater reliance must be placed on active immunization. Epidemics had occurred in well-immunized groups, but the mortality was low.

The efficacy of poliomyelitis vaccine had been demonstrated by the American Surveillance Committee for Polio-

myelitis. They showed that protection was obtained against the paralytic type of disease. Already 10,000,000 doses of that vaccine had been administered in Australia. The results of the Australian Surveillance Committee for Poliomyelitis showed that results compared favourably with those of the Americans, and available evidence suggested 82% to 90% protection in immunized individuals.

Dr. Keen then discussed the reactions to immunizing agents. He said that the reactions to vaccination against smallpox appeared to vary with the geographical position and with the age of the patients involved. There were three main types of reaction—generalized vaccinia, progressive vaccinia and eczema vaccinatum. The first two complications might be associated with abnormalities in the gamma globulin fraction in the blood, but the last-mentioned complication appeared to be a specific inability to form antibodies to the virus. Treatment with hyperimmune vaccinia gamma globulin might result in a successful outcome to those complications.

Reactions to pertussis immunization might be divided into immediate local and general reactions and other rarer complications. Local reactions might be associated with varying degrees of temporary redness or progression to sterile abscess formation. General reactions consisted of mild pyrexia and irritability in the child, which lasted for 24 to 48 hours only.

Immunization against whooping-cough in children with previous convulsions was a common problem. Immunization should be stopped if neurological manifestations occurred during administration of the pertussis antigen. However, some workers considered that that type of child often had severe and fatal encephalopathies during clinical pertussis, and it was held that immunization should proceed cautiously despite an unfavourable history of convulsions.

The reactions to diphtheria and tetanus toxoid were considered together. It was pointed out that the fluid toxoids contained formalin, non-specific protein impurities and the protein of the toxoid in a suspending agent. As the adsorbed toxoids contained less protein impurities and no formalin, they were preferable for primary immunization. Reactions were usually local and subsided rapidly. General reactions might occur, and were usually pyrexial in type, being due to the protein components of the vaccine.

Reactions to poliomyelitis vaccine were so uncommon that they were almost unknown. Although the vaccine contained a small percentage of monkey kidney protein and amino acids, those substances rarely caused reactions. The vaccine contained penicillin and streptomycin, but the penicillin content was less than one unit per millilitre. Caution would be exercised when a patient was known to be sensitive to penicillin or streptomycin. However, as the concentrations were low, such patients should not be deprived of the vaccine. Immunization should be preceded by the administration of a small test dose to assess the level of sensitivity to the antibiotics.

Treatment of Bites of Venomous Animals.

DR. G. F. TRINCA presented a demonstration on the treatment of bites of venomous animals. He said that until fairly recently tiger snake antivenene had been the only antivenene available for the treatment of snake bite. It gave excellent protection against the tiger snake, and varying degrees of cross protection against the venom of other snakes. To afford better protection, additional antivenenes had been developed over the last few years, and there were now specific sera for the treatment of snake bite by the taipan, the death adder and the Papuan black snake. The identification of the snake involved was of considerable importance in treatment. That would determine the choice of antivenene if a specific one was available, or the initial dosage if, for example, tiger snake or taipan antivenene was used for cross protection.

Dr. Trinca said that colour was an uncertain guide in the identification of reptiles, and he showed a series of transparencies to illustrate the variation of colour and markings in venomous snakes. Tiger snakes might be brown and unbanded, or might occur in dark forms. Brown snakes were banded when young, and varied from putty colour to dark brown and occasionally black. Copperheads were frequently miscalled black snakes. The danger lay in the fact that the first three species were very venomous, whereas the black snake was relatively harmless to man.

A series of specimens were exhibited to demonstrate that a knowledge of some simple facts regarding the numbers and arrangement of scales would lead to accurate identification of the snake. Dr. Trinca said that every effort should be made to kill the snake at the time of the bite. If the dorsal scales were counted diagonally in the middle of the body, and if the anal plates and sub-caudal scales were examined to see whether they were single or divided, those features, together with the general appearance of the snake, would lead to identification by reference to a table in the new leaflet accompanying antivenenes. If the species of snake responsible was unknown, then reference to a further table would show the most suitable antivenene and dosage for a particular locality.

First-aid measures to be at all successful must be instituted promptly. The keynote of treatment was the intravenous injection of adequate doses of the appropriate antivenene. A schema of preliminary sensitivity testing to avoid anaphylactic reactions was also discussed.

Specimens of the red-back spider (*Latrodectus hasseltii*) and the Sydney funnel web (*Atrax robustus*) were shown, including some dissections displaying the venom glands and fangs. Dr. Trinca said that the cardinal symptoms of red-back spider bite were pain, often spreading widely, profuse sweating, nausea, vomiting and weakness. The duration of the illness varied from three to eight days; but if red-back spider antivenene was administered promptly, it was reduced to less than a day, symptoms often resolving within an hour. If the response was at all slow, additional antivenene should be given. Attempts to produce an antivenene against the funnel-web spider had been unsuccessful, owing to poor antigenicity of the venom. The general lines of treatment would be to limit or delay absorption of venom by ligature, scarification, suction and immobilization. The local injection of 0·1 ml. of a 5% solution of potassium permanganate would be of value in neutralizing the venom. Atropine was useful in overcoming some of the parasympathomimetic actions of the venom.

Preparation of Allergy Extracts.

MISS DERRICK and DR. J. TRINCA demonstrated pollination of hay-fever plants and the method of preparing allergen extracts.

A series of photographs taken in the Allergen Department depicted the main stages in the collecting, drying, extracting, standardizing and bottling of an extract.

Samples of paspalum, dock and chrysanthemum were exhibited to show how pollen was shed and collected. The distinctive features of pollen grains and their resemblance to mould spores were illustrated by means of micro-photographs.

Pictures of some of the common hay-fever plants, diagrams of their inflorescences, charts of their flowering period and their relative importance clinically were displayed.

A pasture map demonstrated the distribution of native and introduced grasses and weeds throughout Australia.

The relative importance of pollens, foods, dust, danders and miscellaneous allergens was shown on a chart prepared from studies of more than 2000 consecutive prescriptions received at the Laboratories.

Demonstration of the Cohn Blood Fractionator.

The Cohn fractionator was demonstrated by MR. E. MASON and DR. T. HATFIELD, and its value in the separation of red blood cells, white cells and platelets, with production of a plasma free of all cellular elements, was discussed.

A tandem plasma separator and platelet concentrator arrangement was demonstrated. Platelet-rich plasma from several donations was obtained by passage through the plasma separator bowl, each donation being followed by a wash of 4% sodium citrate solution. That plasma was then passed through the platelet concentrator bowl, and the platelets were recovered from that bowl by successive washings with dextrose-sodium-acetate-saline. The platelet preparation was examined on a counting chamber under the phase microscope, with especial attention to the morphology of the platelets; the platelet concentration was determined by counting.

The demonstration, therefore, showed that the Cohn fractionator could be used to obtain a sterile, highly concentrated platelet suspension with a recovery of at least 50% of the original blood platelets. In addition, it was emphasized that the sterile platelet-free plasma resulting from that separation was a necessary starting point in the preparation of a sterile concentrate of A.H.G. and possibly of other labile proteins.

In connexion with the demonstration, charts were displayed which illustrated the mechanical and chemical principles involved. Also, essential components of the blood separator bowl were exhibited.

Human Blood Groups and Atypical Antibodies in Hæmolytic Disease of the New-Born and in Blood Transfusion Reactions.

The demonstration by MR. R. T. SIMMONS was planned to show the functions of a blood group reference laboratory. The functions were stated as, first, the part it played in controlling the quality of blood-grouping agents and the development of new reagents for general use, and secondly, its place as a reference centre for all problems encountered in blood grouping and blood transfusion, including cases of hæmolytic disease of the new-born. The consultant service was free, and was available to all Australian hospitals and pathologists.

Charts showed the discovery and continuing development of 11 major and independent blood group systems: A_1-A_2-B-O (1900, 1902, 1911); M-N-S-s (1927, 1947); P-Tj^a (1927, 1951); Rh (1940); Lu^a (1946); K (1946); Le^a (1946); Fy^a (1950); JK^a (1951); Wr^a (1953); Di^a (1954).

Other charts showed some 40 antibodies encountered in cross-matching blood, and phenotypes and genotypes in the A-B-O, M-N-S and Rh blood group systems. The blood groups were demonstrated by the Commonwealth Serum Laboratories slide technique, the results of which could be read at a glance. The following reagents were exhibited: blood-grouping serum A-B-O, Coombs reagent (rabbit anti-human serum), blood group specific substances A and B, bovine albumin (30% solution), anti-Rh sera (of various specificities), human serum group AB, etc. Other demonstrations showed Rh_o(D) testing with cells suspended in glucose-citrate solution versus saline and albumin dilutions of complete and incomplete anti-Rh sera, and the use of activated papain as a means of using incomplete anti-Rh sera for clinical Rh testing. The classification of the sub-groups of A into types A_1 and A_2 was demonstrated with the use of an extract of *Dolichos biflorus* seeds. Other seeds of use in blood grouping that were shown were: *Vicia graminea* (anti-N), *Bauhinea purpurea* (*alba*) (anti-N), lima bean (anti-A) and *Ulex europaeus* (anti-H(O)).

Assay of Tetanus Antitoxin by Hæmagglutination.

A demonstration of the purification of tetanus toxin for use in hæmagglutination tests for estimating antitoxin was given by MR. R. W. PATTERSON. He said that crude tetanus toxins had been shown to contain a variety of soluble antigens which, on injection into the horse during hyper-immunization, produced corresponding antibodies. When those toxins were used in the estimation of antitoxin by in-vivo methods, the end point of the test was easily seen by characteristic tetanus spastic paralysis or death. That animal test, therefore, depended on the amount of specific killing antigen in the mixture. However, in-vitro methods, such as the H.A. technique, were not selective for that factor from crude toxin; thus an essential preliminary task was to free the crude antigen mixture from all but the specific killing antigen. Exhibits showed the stages in fractional separation of antigens from crude tetanus toxins, and also the methods adopted to test the specificity and purity of those fractions. The demonstration set out the general method of the hæmagglutination technique as applied to the titration of antitoxin in human sera.

Plasmin (Fibrinolysin).

A demonstration by MR. W. S. TAYLOR indicated studies being carried out in the preparation of plasminogen (profibrinolysin). It was stated that that compound was the precursor of plasmin (fibrinolysin), the proteolytic enzyme whose physiological role was believed to be in the lysis of the fibrin deposits in blood vessels and tissues resulting from minor injuries and spontaneous thromboses of everyday life. Plasminogen was prepared by treatment of Fraction III-3 from the Cohn alcoholic fractionation of human plasma. By controlled extraction, a protein of approximately 70% purity had been prepared. The plasminogen was converted to plasmin and purified. The stability of the lyophilized product to storage was being examined.

The assay of plasminogen was illustrated by conversion to plasmin with streptokinase and measurement of the lysis time *in vitro* of a standard fibrin clot. A spectrophotometric method using a synthetic substrate benzoyl-arginine methyl ester was also demonstrated.

Isotope Counting, Curtain Electrophoresis, Sonic Disintegration of Cells.

DR. J. O'DEA demonstrated three techniques currently being used in biochemical research studies at the Commonwealth Serum Laboratories. Working models showed the application of curtain or continuous flow electrophoresis to the separation of a mixture of dyestuffs and to the resolution of an animal serum into some 30 components varying in composition from pure albumin to sub-fractions of gamma-globulin. A ten-kilocycle sonic oscillator was used to show the rapid sonic disintegration of bacterial and tissue culture cells. Dr. O'Dea said that by that method, high yields of intracellular macromolecular material and enzymes were readily obtained. Radioisotope-labelled materials were now extensively used as a powerful tool in both scientific research and diagnostic medicine. Dr. O'Dea demonstrated the handling of samples preparatory to counting, as well as equipment which permitted the efficient continuous automatic counting of the radiations from up to 35 specimens. "Soft" beta radiations from materials such as C-14, S-35 and tritium were shown to be counted with high efficiency.

The Isolation of Serum Lipoproteins and Recording Spectrophotometry.

DR. K. J. TURNER demonstrated three methods in current use for the isolation of serum lipoproteins. The first was the flotation method. Dr. Turner said that modification of the original Gofman procedure involved stepwise flotation under high gravitational fields on solvents of varying density. Four discrete lipoprotein fractions might be obtained in limited amount from that procedure. The second was the Cohn fractionation method, which employed precipitation of proteins by the addition of ethanol to buffered serum. Both alpha and beta lipoproteins might be isolated as separate entities by the application of that technique. The third was the polysaccharide precipitation method. (*a*) Dr. Turner said that "Dextran Sulphate" of high molecular weight formed insoluble complexes with beta lipoprotein. When those precipitates were redissolved, layered into a saline gradient and centrifuged, the lipoprotein floated to the top of the tube while the "Dextran Sulphate" sedimented. That technique yielded high concentrations of material relatively free from contaminants. (*b*) Dr. Turner said that the sulphated polysaccharide carrageenin reacted in a similar manner to "Dextran Sulphate". Electrophoretic analysis of precipitates and supernatants was used to indicate the efficiency of removal of beta lipoprotein from serum.

A comparison between the absorption spectra of beta lipoprotein and beta carotene in the range 350 to 550 mμ was demonstrated on a recording spectrophotometer. Characteristic ultra-violet, visible and infra-red spectra were also recorded.

Strip Electrophoresis of Proteins.

MISS M. GILBO demonstrated some techniques and applications of paper strip electrophoresis. The first part of the demonstration showed the details of the electrophoretic procedure itself—the preparation for use of both vertical (hanging strip) and horizontal type cells, details of the paper used, buffers, voltages and amperages, precautions necessary to prevent distortion of the pattern, and application of the sample in volumes down to 0·006 ml. with micro pipettes. Miss Gilbo said that paper strip electrophoresis had been applied at the Commonwealth Serum Laboratories to proteins from many sources, and to other substances—for example, normal and abnormal sera, serum fractions from curtain electrophoresis or chromatographic column work, tetanus and staphylococcal toxins, snake and bee venoms, and spider and stonefish venom—details of which were seen in other demonstrations. Stains and staining techniques showing the presence of specific substances on the strips after electrophoresis were also displayed, for proteins, lipoproteins, glycoproteins, peptides, amino acids and polysaccharides. Two automatic scanning and recording instruments for the quantitation of the bands produced in strips by the procedures mentioned were also in operation—the "Spinco R B Analytrol" and the "Photovolt Densitometer".

Cellulose Chromatography of Serum Proteins.

A demonstration of cellulose chromatography of serum proteins showed some techniques used during the separation of protein mixtures by column chromatography. The demonstration was presented by MR. A. MARR and MR. J. PETERS. The basis of the method was illustrated by a DEAE-cellulose column showing the separation of a mixture of dyestuffs. A working exhibit showed the use of a fraction collector to obtain successive samples of the column effluent, which was then analysed for protein by ultra-violet absorption measurements on a spectrophotometer. The recovery of isolated protein components was illustrated by samples undergoing dialysis and by examples of the final freeze-dried preparations.

Results obtained during the examination of normal human and bovine sera were presented graphically in the form of elution curves with photographs of paper electrophoresis patterns of the isolated components. Applications of the method to the preparation of serum proteins for testing as tissue culture nutrients to the examination of sera from suspected cases of myelomatosis, and to the isolation of pure toxin from *Clostridium tetani* culture filtrates were also described.

Analytical Ultracentrifugation.

Analytical ultracentrifugation, as used as a routine procedure in the examination of normal and abnormal human serum, was demonstrated by MR. G. S. WILSON. Equipment was shown which permitted the analysis of high molecular weight materials by sedimentation methods employing gravitational fields of the order of 250,000 times gravity. Photographs taken at intervals recorded the sedimentation of components, and enabled characteristic sedimentation coefficients to be calculated.

Continuous Cell Line Tissue Cultures.

MISS J. FERGUSON and MISS A. WANSBROUGH demonstrated continuous cell line-tissue cultures. It was pointed out that in various laboratories throughout the world certain cells had been isolated which showed the property of rapid and continuous multiplication. Those cells had been isolated from a wide variety of tissues, both normal and malignant, and were used in the laboratory for virus and immunology studies. Currently at the Commonwealth Serum Laboratories approximately 20 of those cell lines were being maintained.

It was further stated that long-term storage methods had been developed for three reasons: (i) to prevent the loss of a line through bacterial contamination of the cultures; (ii) to have, if needed, a stable cell population for immunological work; (iii) to lessen the very considerable time taken in maintaining those cells in continuous culture. The most satisfactory method of storage was to place a heavy suspension of cells in growth medium plus 10% glycerol (Merck's) into a one-millilitre ampoule, then store it in a cabinet at −65° C. The cells would remain viable over long periods, provided they were thawed carefully in a water bath at 37° C.

When a cell line was injected into an animal, antibodies to that cell were produced, which were called cytotoxic antibodies. That immune serum was then found to be toxic to the cell line when tested *in vitro*. Cytotoxic antibody was measured by a metabolic inhibition technique. Dilutions of serum were tested against a constant concentration of metabolizing cells, and the pH of the culture fluid gave a measure of the number of viable cells remaining in the tube.

Characterization of cells by means of their chromosome number and distribution gave valuable information about the origin of cells and about the changes which might take place in the development and continuation of a cell line. A simple method had been developed for viewing stained and well-separated chromosomes by means of the oil-immersion lens of a phase microscope. That method was: (i) colchicine was added, to arrest cells in mitosis; (ii) the cells were suspended in a hypotonic solution, to spread the chromosomes; (iii) fixative was added, to harden cell membrane; (iv) the whole was air dried, to bring the chromosomes into one plane; (v) staining was done.

Tissue Culture Nutrition.

MR. J. WHITE demonstrated the preparation of normal cells for assessing tissue culture nutrition. Monkey kidney epithelial cells were prepared at 32° C. by the addition of aliquots of trypsin at five-minute intervals. The cells dislodged from the kidney cortex after each digestion were harvested before the next trypsin addition. From such digestion, a cell suspension was prepared for addition to varying media and sera components. An automatic dispenser was shown rapidly dispensing equal volumes of media and cells to tissue-culture bottles. Cells adherent to the glass after one and seven days' incubation were demonstrated. The number of cells growing from the few originally adhering was an indication of the growth-promoting properties of the test system. A quantitative assessment of the number of cells in each bottle was made by staining the nuclei after suitable disruption of the cytoplasm and the use of microscope-hæmocytometer counting. Graphs showing the growth observed in varying media and serum combinations were displayed. They illustrated the importance of serum for growth of tissue-culture cells. Mr. White said that fractions of serum had been found which were able to support cell growth as well as, or better than, serum. Protein analysis charts showed such active fractions to contain alpha globulins and albumins.

Evaluation of Anti-Poliomyelitis Vaccine.

MISS S. BROWN demonstrated the evaluation of anti-poliomyelitis vaccine. Fourfold serial dilutions of patients' serum before and after vaccination were made. Dilutions of standard virus (three types) were prepared and added to serum dilutions in equal amounts by means of Cornwall automatic pipetting syringes. After standing at 4° C. for one hour to allow neutralization, the mixtures were inoculated into monkey kidney tissue culture tubes, incubated at 37° C. for six days, and examined microscopically for tissue degeneration. Examples were exhibited.

Result sheets displayed serum titres and geometric mean figures for a group of children against the three types of polio. In persons failing to show antibody to any polio type before vaccination, a geometric mean titre of approximately 20 was found after two doses of vaccine, and of at least 300 with each of the three types after three doses of vaccine. An occasional person was found who failed to produce a significant titre after three doses of polio vaccine.

Diagnosis of Virus Infections.

Some aspects of virus isolation and epidemiology were demonstrated by MRS. R. MCCUTCHEON and MR. W. DENNIS.

It was stated that specimens from patients with suspected poliomyelitis were frequently received. The presence of polio virus or other organisms causing aseptic meningitis or non-paralytic poliomyelitis, such as the Coxsackie or ECHO viruses, could be detected. Respiratory infections were also studied, particular interest being given to the adeno viruses, in either epidemic or sporadic form.

Specimens, or their extracts, were inoculated into tubes containing a monolayer of tissue culture cells, such as monkey or human kidney epithelium, depending on the group of viruses suspected. After an interval of several days' incubation at 37° C., the tubes were inspected for virus multiplication as seen by typical degeneration in the host cells. The viruses isolated were then subjected to further tests in order to identify them. Stocks of antisera prepared in monkeys or rabbits against prototype viruses were combined individually with the newly isolated virus, and the mixture was inoculated in a fresh series of tubes. Should a particular antiserum be specific for the virus under test, the cell monolayer remained unchanged in appearance, while the other antisera not neutralizing the virus would allow virus growth. If those viruses prevalent in the community could be ascertained, appropriate vaccines could be prepared to reduce the incidence of the infections caused by them.

Staphylococcal Research.

DR. E. R. H. CLARKE said that the B.P. required that the potency of staphylococcus toxoid be tested by injecting it into guinea-pigs under standard conditions and measuring the number of units of alpha antitoxin produced in the serum. However, it was very doubtful whether alpha antitoxin gave much protection against staphylococcal infections. If more was known about the immunological responses of humans to staphylococcus antigens, it might be possible to prepare more effective immunizing agents. Demonstration showed the steps in the production of purer staphylococcal antigens from cultures grown in cellophane tubing, together with the results of the electrophoretic analysis of those antigens. In addition, precipitin reactions in agar for comparing antigen-antibody systems were demonstrated.

DR. E. A. NORTH gave a demonstration of original work being carried out by himself and Miss Doery on non-specific factors involved in immunity against staphylococcal disease. He said that the work was founded on the concept that vascular spasm was the basis of staphylococcal lesions. If that concept was sound, an antagonist might conceivably be found amongst vasodilators. Such venoms had a vasodilator effect, and it had been found that a number of venoms including those of several species of snake and of the honey bee, protected mice against the action of staphylococcal alpha toxin and against infection with living staphylococci. All the venoms found to confer protection contained the enzyme phosphatidase A, and the protective value of a venom appeared to depend on the proportion of that enzyme which it contained. A further development of that work showed that the products of the action of phosphatidase A on phosphatides—namely, certain long-chain fatty acids and lysophosphatide—were also protective.

Experiments in mice were demonstrated showing the protective effect of a fraction of tiger-snake venom, of honey-bee venom and of lyso-myristoyl lecithin against the *lethal effect of staphylococcal toxin.*

MISS J. PHILLIPS discussed phage typing and its use in epidemiology. She said that phage typing was the most refined method available for the characterization of staphylococci, and for deciding whether any pair of coagulase-positive strains was identical or not. Its use in epidemiology was obvious. The demonstration showed the steps in the preparation of a staphylococcal bacteriophage, together with examples of the use of phage typing to distinguish the different phage groups found in epidemiological studies.

Miss Phillips also discussed penicillin resistance. She said *that penicillin was still the best antibiotic for use* against penicillin-sensitive staphylococci. Penicillin-resistant staphylococci encountered clinically were protected against *penicillin by their production of the enzyme penicillinase,* which hydrolysed and thus inactivated penicillin. However, if the concentration of penicillinase was reduced sufficiently, it *had been found that those penicillinase-producing staphylo*cocci were sensitive to penicillin. The demonstration showed the initial steps in a project to find an anti-penicillinase *suitable for trial in association with penicillin in the treat*ment of penicillin-resistant staphylococcal infections.

Out of the Past.

THE N.S.W. ARMY MEDICAL CORPS IN THE BOER WAR.[1]

[From the Australasian Medical Gazette, November, 1889.]

VERY great praise is due to Colonel W. D. C. Williams the principal medical officer of the New South Wales Army, for the standard of efficiency of the army medical service of that colony. It is due to his powers of organization, and his constant cheerful application, that everything was in readiness at the shortest notice. The medical officers accompanying Colonel Williams to South Africa, Drs. Fiaschi, Roth, Green, Perkins, Martin, Edwards, McDonnell and similar medical volunteers from other colonies viz: Dr. Hopkins, Vic., Dr. Toll, S.A., and others whose names have not been forwarded to us have shown great self-sacrifice in volunteering for service abroad, they deserve great praise, seeing that such action will take them away from their extensive and lucrative practices. Their offer for service abroad constitutes another of those numerous instances of devotion to duty so often exhibited by members of our profession. We are sure that both officers and men will do good work. The risks to the medical officers and ambulance bearers in war are always great, but in this war they are very great, for it has been, we regret to say, stated in the newspapers that it is officially reported that the Boers have fired upon a red-cross flag, also upon ambulances and a hospital.

Correspondence.

MEDICAL RESEARCH IN AUSTRALIA.

SIR: The recent letter of Sir Macfarlane Burnet in THE MEDICAL JOURNAL OF AUSTRALIA (January 23, 1960) calls for some comment. Even granting that there may be some waste of money and effort due to "second-rate" incoordinated investigations, it by no means follows that the remedies or remedy suggested by him would be of ultimate benefit to the community. The history of medical and scientific research is full of instances of the stultifying effect of opposition by interested parties. The Medical Research Council is not free from blame on this count, as anyone who is aware of the ludicrous effect of centralized control of research in an investigation of pneumonoconiosis in New South Wales will appreciate.

It would appear from Sir Macfarlane Burnet's letter that, as indicated in paragraphs 2 and 3 thereof, the idea is to have a top executive assisted by a committee to control medical research in its fundamental biological and in its clinical aspects. This they would do by sponsoring or approving certain lines of investigation and allocating or advising the allocation of funds for those projects which met with their approval. It should hardly be necessary to point out that a small committee could not have in it enough members who were sufficiently knowledgeable in all the important fields for research, and a committee which was large enough to have such all-embracing knowledge would be too unwieldy to function efficiently.

If such an organization of research be desirable in the medical and biological fields, there appears to be no reason why similar monopolistic control should not be desirable in the fields of chemistry, physics, geology, etc. Such a set-up would undoubtedly excite the justifiable antagonism of most independent scientists interested in these subjects. In the present circumstances of multiple organizations or bodies allocating funds, it is always possible for an individual investigator who fails to persuade one authority to support his work to try another avenue.

Let us have independence of thought and action in research, even if it involves some waste of effort and funds, rather than centralized control, wherein there is danger that the importance of particular interests will be magnified and others ignored. Lord Acton's dictum that "all power corrupts and absolute power corrupts absolutely" should be borne in mind.

One might ask, who would choose the high executive and who would choose the committee referred to in paragraph 2? Scientists, as are other men, are subject to motives of personal ambition and special interest. In the present circumstances of diversified authority, these may be valuable to the community as stimuli to effort; but with too much centralized control of research they may be dangerous to the wider interests of the health of the people.

If the organization advocated by Sir Macfarlane Burnet is ever established here, it is to be hoped that the high executive and his advisers will be filled with the humility of a Newton or an Einstein; but from the very nature of their appointments, this is unlikely.

Yours, etc.,

D. O. SHIELS.

38 Lisson Grove,
Hawthorn, Victoria.
February 1, 1960.

BLUEPRINT FOR A MODEL PSYCHIATRIC HOSPITAL.

SIR: May I be permitted a few comments on the papers of Dr. Maddison and Dr. Woodforde in your issue of January 8, with their visions of a better world for psychiatric patients? They have been stimulating and provocative of considerable discussion. Dr. Maddison's vision, to me, is somewhat terrifying with its emphasis on groups of various composition and scorn of the pharmaceuticals which give such help in the readjustment of our patients in the "tranquillizing sixties".

What is done to help patients, either in patient groups, activity groups, therapeutic groups proper, staff groups or even the "community-centred training programmes" of Dr. Maddison, seems unclear. If they are to "provide an environment in which patients can learn new patterns of living and obtain more mature gratifications within the framework of cultural restrictions" (Maddison) they will certainly be very valuable to patients and doctors; but they are surely very divorced from the realities of living in a home and a job, and the therapeutic results of such group experiences are still uncertain. They certainly have not been measured statistically. It is at least very doubtful if they in themselves have "led to any profound change in the personality organization of the schizophrenic patient or reversed the damaging effect of his abnormal life experiences".

What will happen in 1999 is anyone's guess; but it seems far more hopeful that more than one or two of the "487 different biochemical or neurophysiological abnormalities" may be shown to be "primary defects in the biological substrate" of the schizophrenic patients and their parents, and that means will have been found to modify these by some further development of biochemistry or biophysics. "The sort of parents you have" is certainly very important, as identical twin studies have shown, "and how they care for you" surely depends on a variety of factors, including their "biological substrate" such as intelligence.

[1] From the original in the Mitchell Library, Sydney.

The emphasis on the role of the psychiatric social worker and the nursing staff "key figures" is important; but what of the general practitioner who appears to be completely absent except for "limited counselling procedures" in association with "ministers of religion, marriage guidance counsellors, pædiatricians and so on"?

If, in fact, the figures quoted by Dr. Woodforde from Dr. Dax are correct—i.e., 25% to 35% of the whole patient attendances in general practice are of a psychiatric nature—then it seems that the medical practitioners should surely be equipped to deal with these at an early stage, rather than to enlist the services of these auxiliary services together with occupational therapists and clinical psychologists under a specialized psychiatric service.

It appears to me that at the present stage of development it is still far too early to minimize the role of organic deficiencies and disorders in the causation of psychiatric ill-health, and wrong to exclude the general practitioner from community psychiatric treatment, particularly in view of the increasing stress laid on emotional factors in the causation of general ill-health and the desirability of caring for psychiatric illness in the community and outside of hospital if at all possible.

For these reasons I would submit that the separation of the psychiatric hospital from the general hospital by a distance of one mile is too great, and that it is quite possible and preferable to make the psychiatric and general wards "integral" parts of one building, where students and doctors of all varieties are in close contact and the teaching of psychiatry is not merely that of a speciality, but an approach to general medicine. I trust that the 1970's do not see this dream dying a "natural death without regrets". No one, so far as I am aware, thinks of a future psychiatric ward in a general hospital being "built to the same pattern and sharing a similar sort of routine" as the rest of the hospital.

In both papers there appears to be an assumption that psychiatric illness is a matter requiring full-time State officials who provide a wide variety of psychiatric services to all in need. This appears to be rapidly becoming accepted, at least in this State, where psychiatric patients are treated free of charge for medical attention and the tranquillizers still liberally supplied in a variety of our patient clinics, day hospitals, receiving houses and mental hospitals without any means test, but with considerable encouragement to come and be cured. On the other hand, medical, surgical and psychiatric patients who attend our general hospitals have to pay heavily and will shortly have to pay still more heavily.

The first out-patient psychiatric clinic in Australia was at the Melbourne Hospital under Dr. H. F. Maudsley, and such clinics are now an accepted part of all our general hospitals and deal with quite a large percentage of the community's psychiatric illnesses, in spite of these heavy payments, the fact that the attending doctors are still largely honorary and that little publicity comes their way. This distinction is, surely, a remnant of the bad old days and their "primitive and deeply determined cultural taboos", unless we are to regard it rather as the pattern of a future nationalized medical service, with all the dangers of bureaucratic control and an all-powerful director to whom we will all be responsible.

This may, of course, lead to "high morale and enthusiasm" under some directors, but has in the past and present led in some quarters to apathy and disinterest. Perhaps in 1999 all directors and all governments will be as Dr. Maddison hopes.

Yours, etc.,

12 Collins Street, Melbourne.
February 3, 1960.

JOHN F. WILLIAMS.

GENERAL PHARMACEUTICAL BENEFITS.

SIR: May I take the opportunity of replying briefly to the questions raised by your editorial on Pharmaceutical Benefits in your issue of February 13, 1960.

Probably the most fundamental is why the Government felt under the necessity of altering the Scheme as it stood. The fact is that the steady discovery and development of new drugs had in any case caused an inevitable and wide expansion of the list of benefits, and that circumstance alone had made it impossible to maintain the original concept of limitation of the list, which was rapidly increasing year by year.

The new arrangement—with some exceptions virtually a single list amalgamating the pensioner benefit list with the general benefit list—does not in fact alter the principles on which the profession has been working previously. The system whereby the doctor could prescribe brand names for general benefits is now extended to the whole list. Every effort has been made to keep clerical procedures to a minimum, and they will indeed be almost identical with those at present used. The full details are incorporated in a new edition of the "Notes for Medical Officers", which has been supplied to members of all British Medical Association State Branch Councils and is now in the process of distribution to doctors generally.

I think it is fair to say that, except for the fact that the list of General Pharmaceutical Benefits will be greatly extended, and that there will no longer be separate lists of general and pensioner benefits, the doctor's routine of prescribing will be virtually unaffected.

Fears have been expressed that the inclusion of a much greater list of drugs will subject the doctor to unwelcome economic pressure in his prescribing. Surely the position is that the more the list is widened, the less will be the so-called economic pressure. I might mention that the new range of benefits is compiled from the recommendations of the Pharmaceutical Benefits Advisory Committee, the majority of whose members has been nominated by the British Medical Association.

It is intended to hold a meeting of the Pharmaceutical Benefits Advisory Committee as soon as the Scheme commences, to consider what further alterations and additions should be made to the list of available drugs. In this connexion, may I point out that there need be no fears of the quality of the drugs employed, as no drug can be added to the list without the approval of this Committee.

Finally, the new arrangements were not designed as a mere "money-saving" device, but to introduce some financial stability into an element of the National Health Service which was threatening to dominate the entire Service, with corresponding distortions in other directions. The financial aspects were dealt with by me in my Second Reading Speech when introducing the Bill, and have already been reported in the Journal.

Yours, etc.,

DONALD A. CAMERON,
Minister for Health.

Parliament House,
Canberra, A.C.T.
February 16, 1960.

Post-Graduate Work.

POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF ADELAIDE.

PROGRAMME FOR 1960.

The following programme has been drawn up as a guide for those who plan to do post-graduate study in Adelaide in 1960.

Course in New Scientific Techniques and Developments in Medicine.

A series of lectures will be conducted weekly on Monday evenings from 5.15 p.m. to 6.15 p.m. during the Adelaide University Year commencing on Monday, March 14, 1960. The lectures will be held in the Verco Theatre in the grounds of the Royal Adelaide Hospital, where parking facilities are available. The lectures are designed for graduates and senior undergraduates in medicine and in the biological sciences, and should appeal to a wide range of interests. They will be given by men selected for their particular knowledge of the subject.

The programme for first term is as follows: March 14: "Human Genetics I: Chromosomal Aberrations in Human Disease", by D. L. Hayman, Lecturer in Genetics, University of Adelaide. March 21: "Human Genetics II: Inherited Biochemical Disorders in Man", by Dr. M. J. Mayo, Senior Lecturer in Genetics, University of Adelaide. March 28: "Electron Microscopy", by Professor J. S. Robertson, Professor of Pathology, University of Adelaide. April 4: "Cellular Structure", by Professor R. K. Morton, Professor of Agricultural Chemistry, University of Adelaide. April 11: "Cellular Metabolism", by Professor R. K. Morton. May 2: "Chemical Carcinogenesis", by Professor G. M. Badger, Professor of Organic Chemistry, University of Adelaide. May 9: "The Metabolism of Tumour Cells", by Professor R. K. Morton.

Courses for Higher Degrees.

Course in the Basic Sciences Suitable for Candidates for Part I of the F.R.A.C.S. and F.F.A.R.A.C.S.

Weekly viva-voce tutorials will be conducted by the Departments of Anatomy, Pathology and Physiology in the University of Adelaide, commencing on March 14, 1960.

Course in Advanced Medicine Suitable for Candidates for the M.R.A.C.P.

A six months' course of lectures, demonstrations and presentation of cases will commence on April 4, 1960.

Surgery.

In collaboration with the Royal Australasian College of Surgeons, weekly tutorials in clinical surgery for the Final Fellowship examinations will be carried out by surgeons during 1960 when a sufficient number of applications are received.

Refresher Courses.

General Refresher Week.

A full-time general medical and surgical refresher course will be conducted from May 9 to 13, 1960, at the Royal Adelaide Hospital and The Queen Elizabeth Hospital.

Pædiatric Refresher Week.

The honorary medical staff of the Adelaide Children's Hospital will conduct a full-time refresher course of lectures, case demonstrations and discussions from August 22 to 26, 1960.

Obstetric Refresher Week.

The Department of Obstetrics and Gynæcology of the University of Adelaide will in October, 1960, conduct a refresher course at The Queen Elizabeth Hospital at which a guest professor will be present. There will be opportunities for those who wish to live in at the hospital.

Medical Ward Rounds.

Ward rounds will be conducted at the Royal Adelaide Hospital and The Queen Elizabeth Hospital on Wednesday afternoons, commencing at 4.30 p.m. The first series is from March 9 to June 8, 1960, and the second series from August 3 to October 26, 1960.

Enrolments.

Inquiries regarding all courses should be made through the Post-Graduate Committee in Medicine, University of Adelaide, Medical School, Frome Road (telephone: W 3211).

Notes and News.

New Pharmaceutical Benefits Scheme.

The Commonwealth Minister for Health, Dr. D. A. Cameron, announced on February 16, 1960, that preparations were well advanced for the introduction of the new Pharmaceutical Benefits Scheme on March 1, as planned. The way had been cleared for early implementation of the scheme by agreement between the Government and the Pharmaceutical Services Guild of Australia on the terms which the Guild was prepared to recommend to its members for dispensing under the new arrangement. This agreement had been reached after extensive joint investigation and consultation between the Government and the Guild.

Dr. Cameron said that the Government regarded the new scheme confidently as an economical method of extending to the community as a whole the hitherto limited application of the pharmaceutical benefits legislation. Under the new arrangement, patients receiving from chemists drugs prescribed by doctors would pay the chemist 5s. for each prescription or repeat prescription dispensed. Where a drug costs less than 5s. the patient would pay only the chemist's normal charge. Prescriptions for benefits made up for pensioners in possession of a Pensioners' Medical Service Entitlement card would continue to be free. The application of the fee of 5s. had two significant consequences. First, it would stabilize the ever-increasing cost of the previously free scheme—a consideration which the more thoughtful taxpayer would readily appreciate. More important, however, it made possible the expansion of the former list of free medicines to a greatly widened area of prescribing. Whereas hitherto a number of people received a restricted list of doctors' prescriptions without charge, in future a much wider list of prescriptions written by doctors would become available as pharmaceutical benefits. Drugs would be available in some form or other under the new scheme for the treatment of virtually every illness or disability encountered by doctors.

Dr. Cameron urged the public to recognize the payment of 5s. as representing merely the first 5s. of the total cost of the drug supplied. The remainder of the cost, usually amounting to far more than 5s., and in some instances ranging as high as £8 per prescription, would still be met by the Commonwealth. That meant that the whole community would enjoy the reassurance that the cost to the individual patient would not exceed 5s.

WHO Tuberculosis Seminar.

A seminar on tuberculosis control, covering the public health and preventive medicine aspects of the disease, will be held in Sydney from Monday, May 23, to Friday, June 3, 1960. Sponsored jointly by the Commonwealth Government of Australia, the World Health Organization (WHO) and the National Association for the Prevention of Tuberculosis in Australia (NAPTA), it will be held at the School of Public Health and Tropical Medicine, University of Sydney, by courtesy of the University authorities.

To correct any misunderstanding among the members of the medical profession, it is emphasized that a seminar, as WHO understands it, consists of selected experts brought together with selected consultants to discuss one topic in an intensive manner. No papers are read, but panel discussions are organized, group discussions are held and each aspect of the subject is concluded with a plenary session in which all invited participants are encouraged to speak fully.

The objectives of this seminar are as follows: (i) To bring together participants who are medical officers concerned with tuberculosis control in their respective countries, and several consultants of international reputation. (ii) To discuss, and formulate conclusions on, tuberculosis control in the countries represented, in the light of recent advances in the field. Emphasis will be placed on the public health and the preventive aspects of programme planning. (iii) More specifically, to give detailed consideration to surveys, case-finding, diagnosis, treatment, the organization of domiciliary chemotherapy schemes, prevention (including protective vaccination), training of personnel and health education of the public.

Ten official participants have been invited from Australia (including all the State Directors of Tuberculosis), and one each from New Zealand, New Caledonia, Papua and New Guinea, Western Samoa, North Borneo, Pakistan, Brunei, Macao, Sarawak, Hong Kong, Netherlands New Guinea, China (Taiwan), the United States Pacific Territories, Korea, Singapore, the Solomon Islands, Japan, the Philippines, French Polynesia, Vietnam, Cambodia, Laos, the New Hebrides, Indonesia, Ceylon, Thailand and Burma. This adds up to 38 official participants from 28 countries.

The consultants include Dr. Walsh McDermott of New York, Dr. P. V. Benjamin of India, Dr. Hilary Roche, Commonwealth Director of Tuberculosis for Australia, and a specialist from WHO, Geneva. At the invitation of the sponsors, Dr. Cotter Harvey has accepted the position of seminar director. It is expected that Sir Harry Wunderly, who is now abroad, will be returning to take part in the proceedings.

The Commonwealth Department of Health, representing the host country, will send invitations to medical organizations in Australia to send one official observer each to the seminar. In addition there will be accommodation at the plenary sessions, but not at the discussion groups, for interested members of the medical profession to be present as observers, but without the right to speak. The sponsors have decided, though with regret, that it is necessary to limit the number of full participants in this way so that our foreign guests may have full opportunities to speak and will not be outnumbered by participants from the host country.

The planning of the seminar is being carried out by a steering committee based on Canberra and a local executive committee based on Sydney, on both of which the three sponsors are represented. They have enjoyed the fullest cooperation of the Department of External Affairs, the University authorities, Professor Sir Edward Ford and Dr. Wyllie, Principal of Wesley College, where the overseas participants will be accommodated. The Western Pacific Regional Office of WHO in Manila is responsible for overseas arrangements, including the issuing of invitations and information bulletins, overseas travel for participants and consultants, the commissioning of working papers, etc.

The draft programme has been completed, and a copy will probably be published when it has been approved by the sponsors.

Arrangements are being made for participants to visit some of the other States after the seminar.

A report on the seminar will be prepared by the Director and, after its approval by the sponsors, will be furnished to participating governments and persons, and to any members of the profession who may be interested.

The Royal Australasian College of Physicians.

OFFICE BEARERS, 1960-1962.

THE following have been elected office bearers of The Royal Australasian College of Physicians for the period 1960-1962, and will take office at the annual meeting of the College, to be held in Melbourne on May 25, 1960. *President*: Thomas Moore Greenaway, M.B., Ch.M., F.R.C.P. (London), F.R.A.C.P., of Sydney. *Vice-Presidents*: Frank Raymond Hone, B.Sc., M.D., B.S., F.R.A.C.P., of Adelaide; Harry Maynard Rennie, M.B., B.S., F.R.C.P. (London), F.R.A.C.P., of Sydney; Edward Henry Roche, M.D., B.S., F.R.A.C.P., of Auckland. *Censor-in-Chief*: Kenneth Beeson Noad, M.D., Ch.M., F.R.C.P. (London), F.R.A.C.P., of Sydney. *Honorary Treasurer*: George Bruce Dalrymple Hall, M.B., Ch.M., M.R.C.P. (London), F.R.A.C.P., of Sydney. *Honorary Secretary*: Richard Lalor Harris, M.B., B.S., F.R.A.C.P., of Sydney.

Medical Practice.

POLICE OFFENCES (AMENDMENT) ACT, 1908.

The following notice appeared in the *Government Gazette of the State of New South Wales*, No. 22, of February 5, 1960.

POLICE OFFENCES (AMENDMENT) ACT, 1908, AS AMENDED.

Withdrawal of Authority to Be in Possession of Drugs.

It is hereby notified for general information that under the provisions of Regulation No. 25 of the Police Offences *(Amendment) Act, 1908, as amended, the authority of Dr.* John Alfred Porter to be in possession of drugs to which the Act applies for the purpose of his profession and to *issue prescriptions for such drugs, is withdrawn as on and* from 22nd February, 1960.

C. A. KELLY,
Chief Secretary.

Notice.

THE CHILDREN'S MEDICAL RESEARCH FOUNDATION OF NEW SOUTH WALES.

THE following is a list of donations to the Children's Medical Research Foundation of N.S.W. received from members of the medical profession in the period January 10 to February 15, 1960.

Dr. T. W. Freeman: £26 5s.

Dr. and Mrs. N. Hinds (further): £12 12s.

Dr. P. A. Earnshaw, Dr. and Mrs. E. F. Dowe: £10 10s.

Dr. and Mrs. Ralph Cameron (further): £5 5s. 6d.

Dr. C. P. Reilly (further), Dr. Walter Utber: £5 5s.

Dr. M. A. Turek, Dr. John Carpenter: £5.

Dr. K. H. Star: £1 1s.

Previously acknowledged: £10,151 14s. 10d. Total received to date: £10,238 8s. 4d.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JANUARY 23, 1960.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	2(1)	1	1	..	..	..	..	..	4
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	12	..	12
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	4(3)	18(12)	1(1)	..	3(3)	..	1	..	22
Diphtheria	..	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	..	2(2)	3(1)	2(2)	..	..	..	..	7
Encephalitis	..	1(1)	..	1	..	..	..	..	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	1(1)	..	..	1
Infective Hepatitis	84(26)	24(20)	6	9(2)	2(1)	..	..	1	126
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	4	..	..	..	..	..	4
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal infection	..	3(3)	1	..	..	..	..	..	4
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	..	..	..	2	..	..	..	2
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	..	5(5)	1	2	1(1)	..	..	..	9
Salmonella Infection	..	..	..	1(1)	1(1)	..	..	..	2
Scarlet Fever	3(2)	2(2)	..	..	..	..	..	..	5
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	1	..	..	..	1
Trachoma	..	..	..	..	..	..	9	..	9
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	22(11)	12(10)	14(3)	8(7)	10(6)	1(1)	..	1	68
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Ropicki, Lydia Irena, M.D., 1934 (Univ. Graz), (licensed under Section 21c of the *Medical Practitioners Act*), 37 Robert Street, Marrickville.

Renwick, Stuart Buckle, M.B., B.S., 1959 (Univ. Sydney), 6 Ray Avenue, Vaucluse.

Bracken, Barry Carsluith, M.B., B.S., 1954 (Univ. Sydney), 141 Macquarie Street, Sydney.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association: Apted, Douglas Frank, provisional registration M.B., B.S., 1960 (Univ. Sydney); Baggott, John Bernard, provisional registration M.B., B.S., 1960 (Univ. Sydney); Miller, Geoffrey Gordon, provisional registration M.B., B.S., 1960 (Univ. Sydney); Carmody, John Spohn, M.B., B.S., 1958 (Univ. Sydney); Fixler, Sylvia, M.B., B.S., 1959 (Univ. Sydney); Flynn, Gerald James, M.B., B.S., 1959 (Univ. Sydney); Ng, Patrick Tat Wah, M.B., B.S., 1959 (Univ. Sydney); Lang, George Andrew, M.D., 1952 (Univ. Budapest) (registered under Section 17 (1) (c) of the *Medical Practitioners Act*); Papaharalambous, Athanasios, M.D., 1940 (Univ. Athens) (registered under Section 17 (2A) of the *Medical Practitioners Act*); Stockler, Gabor, M.D., 1953 (Univ. Budapest) (registered under Section 17 (1) (c) of the *Medical Practitioners Act*); Chariw, Peter, M.D., 1947 (Univ. Vienna) (Licence issued under Section 21c (4) of the *Medical Practitioners Act*).

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association, qualifications being M.B., B.S., 1959 (Univ. Adelaide) unless otherwise stated.

Fahy, Carlien Lorraine, 29 Lockwood Road, Erindale.

Aldor, Thomas Arthur Menachem, 92 Hanson Road, Woodville Gardens.

Bockman, David, Fremantle General Hospital, Fremantle, Western Australia.

Bradtke, Walter John, Waterloo.

Burnell, Richard Hugh, 62 Barnard Street, North Adelaide.

Clayer, John Reeves, 56 East Avenue, Black Forest.

Colquhoun, Harold George, 16 Myrtle Grove, Clovelly Park.

Collins, Kenneth Ernest, 103 High Street, Marryatville.

Downey, Michael Seymour, 49 Northcote Street, Medindie.

Edwards, Robert George, 6 Yeo Avenue, Highgate.

Hocking, Ian Winston, 66 Seafield Avenue, Kingswood.

Lipert, John Raymond, 5 Kinedana Grove, Kinedana via Eden Hills.

Loke, Wye Tuck, 9 Gardner Street, Plympton.

Rush, Gillian Mary, 52 Diagonal Road, East Glenelg.

Saunders, Elizabeth Stuart, 27 Northumberland Street, Tusmore.

Wells, Peter, 57c Seacombe Road, Seacombe Gardens.

Welch, Ian Donald, 60 Hay Road, Linden Park.

Wise, Peter Hermann, 17 Emerson Grove, Tranmere.

Wangel, Anders Gustaf, 17 Mitchell Street, Hyde Park.

Wigg, David Ross, 10 Edwin Terrace, Gilberton.

Gun, Richard Townsend, 10 Briar Avenue, Medindie.

Kinlough, Margaret Anne, M.B., B.S., 1957 (Univ. Adelaide), 70 Malvern Avenue, Malvern.

Lippett, Richard, M.B., B.S., 1956 (Univ. Adelaide), 2 Heath Avenue, Manningham.

Rippert, Reinhart, M.B., B.S., 1957 (Univ. Adelaide), 17 Whinham Street, Prospect.

Dellow, Peter Glynn, M.B., B.S., 1956 (Univ. Adelaide), 36 Esplanade, Somerton.

Baumgarten, Alexander, M.B., B.S., 1959 (Univ. Sydney), Royal Adelaide Hospital, North Terrace, Adelaide.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association: Panikkar, Radhakrishnan Narayana, M.B., B.S., 1958 (Univ. Adelaide); Beilby, Jack Canavan, M.B., B.S., 1955 (Univ. Adelaide); Milencewicz Witalius, M.B., B.S., 1958 (Univ. Adelaide).

Deaths.

THE following deaths have been announced:

BRODIE.—Robert Charles Espinasse Brodie, on February 10, 1960, at Melbourne.

HOLDING.—William Charles Holding, on February 11, 1960, at Melbourne.

Diary for the Month.

MARCH 1.—New South Wales Branch, B.M.A.: Organization and Science Committee.
MARCH 2.—Western Australian Branch, B.M.A.: Branch Council.
MARCH 3.—South Australian Branch, B.M.A.: Council Meeting.
MARCH 4.—Queensland Branch, B.M.A.: General Meeting.
MARCH 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

Authors of papers are asked to state for inclusion in the title their principal qualifications as well as their relevant appointment and/or the unit, hospital or department from which the paper comes.

References to articles and books should be carefully checked. In a reference to an article in a journal the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of article. In a reference to a book the following information should be given: surname of author, initials of author, year of publication, full title of book, publisher, place of publication, page number (where relevant). The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this Journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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